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Adopt a Stream workbook

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How To Protect Your Favorite River, Stream Or Brook

ADOPT-A-STREAM PROGRAM

Massachusetts Department of Fisheries, Wildlife &
Environmental Law Enforcement

Walter E. Bickford, *Commissioner*

An Agency of the
Executive Office of Environmental Affairs

James S. Hoyte, *Secretary*

Michael S. Dukakis, *Governor*

Adopt-A-Stream Workbook

Prepared by: **Judith Wagner**, Riverways/Open Space Coordinator
Maria Van Dusen, Adopt-A-Stream Coordinator
Michele Monjeau, Assabet River Coordinator

Dear Friend of Rivers:

This **Adopt-A-Stream Workbook** is for all citizens of the Commonwealth who are concerned about the quality and future of our natural resources. The pressures on our open space, waters, and biological ecosystems are great: there is an urgent need for citizens to become involved in the protection and management of these resources.

The Department of Fisheries, Wildlife and Environmental Law Enforcement believes that local citizens can be the crucial factor in protecting our rivers, streams and adjacent riparian lands. This **Workbook** and our Riverways Program are available to support local efforts. In partnership, we can pursue the Goals, Objectives and Action Plans necessary to establish green corridors along clean rivers throughout the Commonwealth. Each year we should be able to measure success by the miles of land protected, and the percent of waters achieving Class B or better rating.

Join us in this venture—you'll thank yourself and so will future generations.

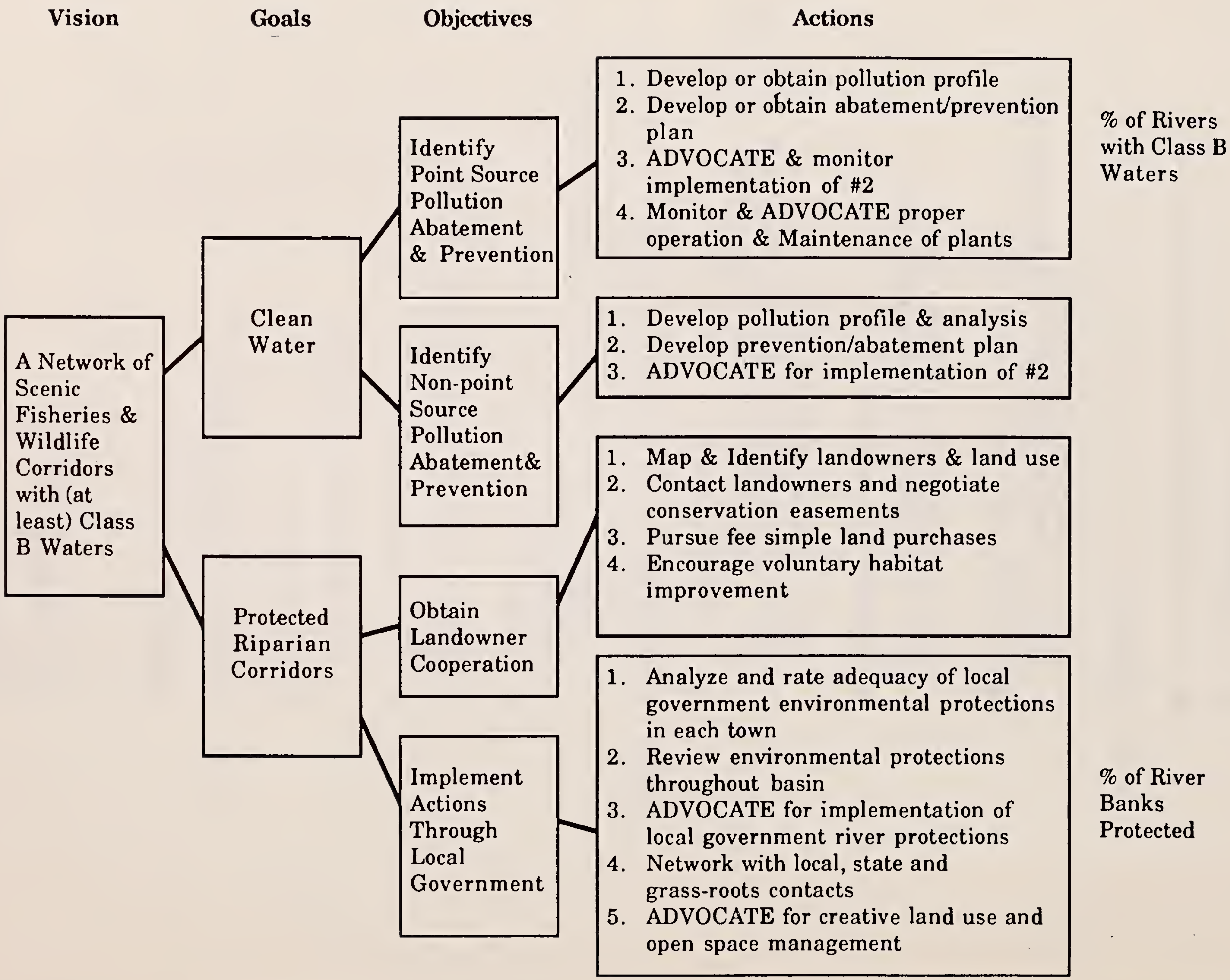
Sincerely,

Walt Bickford

Walter E. Bickford
Commissioner

August, 1987

ADOPT-A-STREAM PROGRAM


Vision
Goals
Objectives
Actions
A Network of Scenic Fisheries & Wildlife Corridors with (at least) Class B Waters
Clean Water
Protected Riparian Corridors
Identify Point Source Pollution Abatement & Prevention
Identify Non-point Source Pollution Abatement& Prevention
Obtain Landowner Cooperation
Implement Actions Through Local Government
% of Rivers with Class B Waters
% of River Banks Protected

1. Develop or obtain pollution profile
2. Develop or obtain abatement/prevention plan
3. ADVOCATE & monitor implementation of #2
4. Monitor & ADVOCATE proper operation & Maintenance of plants

1. Develop pollution profile & analysis
2. Develop prevention/abatement plan
3. ADVOCATE for implementation of #2

1. Map & Identify landowners & land use
2. Contact landowners and negotiate conservation easements
3. Pursue fee simple land purchases
4. Encourage voluntary habitat improvement

1. Analyze and rate adequacy of local government environmental protections in each town
2. Review environmental protections throughout basin
3. ADVOCATE for implementation of local government river protections
4. Network with local, state and grass-roots contacts
5. ADVOCATE for creative land use and open space management

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Adopt-A-Stream Workbook

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PART I

Background Information

- Introduction
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- Issues
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Introduction

This **Adopt-A-Stream Workbook** is designed as a workbook because saving rivers and streams is hard work. But working with your neighbors to protect the water resources in your community can be tremendously satisfying, and, in the end, can secure a lasting legacy of clean water and natural open spaces in which wildlife and people alike can find refuge and take pleasure.

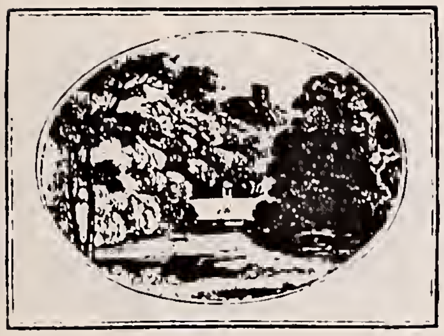
The **Adopt-A-Stream Program**, sponsored by the Massachusetts Department of Fisheries, Wildlife, and Environmental Law Enforcement (DFWELE), is being offered to the public in the belief that local initiative is the key to protecting water resources and natural wildlife habitat in the state.

There is no doubt that the Commonwealth's rivers and streams need protection. Whether they are pristine and need protection to stay that way, or they are overburdened with pollution and physical alterations and require clean-up and relief from development, Massachusetts' rivers and streams need supporters and advocates.

Since the early settlers arrived in New England, the rivers and streams have been a vital force in the local community—driving the economy with power for mills and presses; providing drinking water; offering transport for people and goods; replenishing the fertile lands for agriculture; yielding fish, shellfish and other foods; and always, serving as the waste disposal system for individual households, towns, and industries.

Not long after the first settlements began to establish a foothold in Massachusetts, the rivers began to suffer from the land clearing, construction and development along their banks to use the water for power and processing. Use of the water resources for waste disposal changed the chemical and biological status of rivers, their tributaries and related ponds and lakes. As early as 1663, town records on the Assabet River in central Massachusetts indicate that the pollutants from flax processing were found to be poisoning cattle drinking from the river. The Commonwealth's rivers and streams continue to suffer from over-burdened waste treatment facilities, industrial pollutants and a variety of other direct and indirect pollution.

Progress has been made, to be sure, particularly in the past fifteen years since the passage of the original national Clean Water Act (in 1972) and with the growing awareness of environmental issues. As the public began to understand more clearly the intimate connections between surface waters in lakes, streams and ponds, groundwater beneath the soils, and wetlands (whether inland low-lying areas or prolific coastal marshes and estuaries) there has been an increased demand for cleaner water and greater preventive action to stop destruction of natural water systems. While the state has made great strides in monitoring pollution and regulating discharges, it has often been local people who have been the driving force behind water resource protection, particularly preventing further pollution.



Citizen initiative and on-going involvement is crucial for two central reasons. First, people cause most pollution. People must therefore make some of the complex decisions about the tradeoffs between certain types of development and clean, safe water supplies. Second, in Massachusetts, there is a strong and long-held tradition of "home rule" which gives local governments many more powers to regulate and control local situations than state government. While state government can enact "enabling" legislation, it is local city governments or town meetings who must act to implement measures such as groundwater protections, zoning, development regulations, and wetlands protections. Without the guidance, cooperation, and persistence of citizens who care about water resources and natural open spaces, many of the possible protections will not be utilized until after these resources become so depleted or polluted that the process of clean-up and restoration is difficult, costly and sometimes hardly possible.

Massachusetts has an abundance of groups involved in the issues of clean water, land protection and environmental quality, some of them with many years of experience and excellent track records of solving related problems. In addition, there are a variety of excellent written and other resources available to people who want to get involved in river protection. This **Workbook** points out some of these resources with the intent of enabling people to take action in a community setting. The **Workbook** provides both specific contacts and a general approach for groups to take toward river protection. While the **Workbook** cannot provide an exhaustive review of relevant resources, it highlights what is available.

The purpose of the **Adopt-A-Stream Program** is, simply, to help local people get involved in the protection of rivers and related open space lands.

The purpose of this **Adopt-A-Stream Workbook** is to provide citizens who want to get involved with an overview of the action steps they can take. It is through the partnership of local citizens, local government, the private sector and state government that the goals of clean waters, natural open spaces and healthy ecosystems can be realized.

To participate in the Adopt-A-Stream Program, take these simple steps:

Contact the program coordinator at (617) 727-6278

Review the materials you receive; fill out and return the simple survey forms

Formulate a scope of agreement on activities with Adopt-A-Stream staff

Groups which join the program receive certificate and support to carry out their objectives.

The Adopt-A-Stream Vision

Massachusetts is blessed with bountiful water resources. The Commonwealth has 10,704 river miles, of which almost 1,700 miles are major rivers. In the past fifteen years significant clean-up efforts have brought about 48% of these waters up to the water quality standards which allow their designated uses. The three major categories by which water quality is classified are:

Class A: Drinking water

Class B: Fishable and swimmable

Class C: Secondary contact (boating)

But more than half the major river-miles in the state remain below their designated classification quality.

The lands along these waterways have in many cases been built up, often beyond the capacity of the natural ecosystem. Construction in wetlands and flood plains began to be regulated more carefully in the 1970's, but many existing buildings have reduced the ability of wetlands to help manage flood waters or to recharge crucial groundwater systems. Current dramatic increases in property values are making it attractive for developers to use land that would have been considered marginal in years past because of poor drainage or proximity to flood or wetland areas. The resulting pressure means that a new round of changes in land use is taking place which has serious implications for both water resources and the scenic open spaces along water bodies.

Imagine the benefits to local cities and towns if a network of riparian lands can be created along major riverways and kept in a natural state for non-intrusive recreational use and wildlife habitat. These natural lands will afford not only scenic open space for human restoration and appreciation, but also protected habitat for wildlife. Moreover, these lands can provide a protective buffer for the water resources, advancing efforts to improve water quality, and can offer natural storage for high water conditions.

The vision which propels the **Adopt-A-Stream Program** encompasses a network of green corridors along rivers and streams; open space for human enjoyment and wildlife support; cleaner waters and habitat for fisheries and waterfowl; in short, a mutually beneficial relationship between water resources and the people of the Commonwealth.

The Goals Of The Program

The **Adopt-A-Stream Program** has two main goals which together will help achieve the vision of natural riparian corridors along clean rivers and streams. They are, in brief:

To help local groups protect riparian parcels of land in a natural state; and

To help local groups improve and maintain water quality in key rivers and streams to at least Class B (fishable and swimmable) quality.

These goals are obviously interconnected and complementary. Protecting land without improving water quality makes as little sense as improving water quality but allowing all adjacent lands to be built or utilized for incompatible uses. Particularly in areas with high-quality (Class A) water, maintenance and protection are crucial. By combining these two goals, groups working with their local governments, the **Adopt-A-Stream Program** and similar efforts, can help create healthy and productive habitat for wildlife, fish, birds, and plants.

Protecting habitat corridors has some important effects on the overall ecosystem. First, linear corridors allow movement of species which is prevented when greenspace is limited to isolated, scattered sites. Second, natural reproduction and proliferation of species can more likely occur in varied, less disturbed environments. Riparian corridors are particularly valuable since they are highly productive areas for all sorts of plants and wildlife. Natural open space, used by the public in unintrusive or less concentrated styles, allows wildlife and flora to thrive in a less disrupted environment. This sort of open space use, combined with efforts to improve water quality, is an important complement to the state's excellent system of parks and planned recreational areas.

This **Adopt-A-Stream Workbook** outlines a variety of actions through which you can accomplish these two goals, and realize the overall vision.

The Law, The Regulators And Home Rule

In 1972 the Massachusetts Constitution was amended to read:

The people shall have the right to clean air and water, freedom from excessive and unnecessary noise, and the natural, scenic, historic, and esthetic qualities of their environment; and the protection of the people in their right to the conservation, development and utilization of the agricultural, mineral, forest, water, air and other natural resources is hereby declared to be a public purpose.... (Article 97, Massachusetts Constitution).

This strong guarantee is supported by a variety of environmental agencies and laws. The rivers and riparian lands of the state are protected by several laws at the federal, state and local levels. Federal law is largely mandatory; state law is sometimes mandatory and sometimes framed as "enabling" legislation which provides a framework for local government to use if it decides to exercise the option. Because of the strong "home rule" tradition of local government, Massachusetts cities and towns also have a considerable range of powers which they may choose to utilize.

The laws are enforced by government agencies at the national, state and local levels as well. These regulators are charged with monitoring compliance with environmental legislation or regulations and taking enforcement action if necessary.

One of the difficulties with achieving uniform protection of natural resources such as rivers or open space is that "home rule" operates as though there were 351 autonomous environmental protection agencies across the state—each town and city has the ability to regulate, but may not choose to do so beyond the specific requirements of state and federal laws. On the other hand, local governments may adopt bylaws and regulations more restrictive than those required by state or federal law. This structure invites local involvement: people concerned about rivers and related environmental resources can educate, inform and activate local officials to utilize their powers.

The federal and state laws most pertinent to protecting rivers and related resources, along with the agencies which administer and enforce the law and related regulations, are summarized briefly in the following sections.

THE LAWS. Four major federal statutes provide the framework for river protection and shape related state and local laws. The law with perhaps the greatest impact on water quality is Public Law 92-500 of 1972, generally known as the **"Clean Water Act"**. This law was recently updated and amended and passed by Congress in early 1987 over the President's veto.

In its original version, the law established uniform standards for water quality in rivers, streams and other surface water and mandated sweeping federal and state efforts to clean up rivers and lakes by preventing and eliminating pollution. The two major and highly ambitious goals of the law are to:

1. *Achieve Class B water* (which is clean enough for swimming, other recreational uses, and the protection and propagation of fish, shellfish and wildlife) wherever possible by July 1, 1983; and
2. *Achieve zero discharges of pollutants into the nation's waters by 1985.*

To do this, the law provided for a broad testing, monitoring and permitting process. Permits must be approved for any discharges into rivers and lakes from "point sources" whether municipal wastewater treatment plants, industries or commercial establishments, agricultural facilities or any other source that releases pollutants through outfall pipes, sewers or similar conduits.

The permitting is handled through the National Pollution Discharge Elimination System (NPDES) through which permits to discharge are issued *on the condition* that sources comply with a schedule to reduce pollutants over a specified period of time. Additional measures, monitoring and reporting may be required by the permit. There are serious penalties under this law (and its state counterpart, described below) for failure to comply with the permit system.

In addition, the original Clean Water Act provided for extensive regional planning and management efforts including the development of long-range pollution control plans and major funding for the construction of wastewater treatment plants. Another important provision of the Act is for citizen suits in cases where citizens have evidence that state and federal officials are not enforcing compliance with the law by private or municipal dischargers.

Since its original passage, the Clean Water Act has been effectively reduced in scope by ever-decreasing appropriations for construction and planning. Planning has been eliminated; cost-sharing for construction of treatment facilities has gone from a high of 75% federal share to 55% in 1984. Because of the drastic reduction in financial support, many municipalities must seek new sources of funds for construction programs.

At the same time, federal enforcement of the Act has recently been tightened, and all cities and towns with sewers are being held to a July 1, 1988, deadline for providing at least secondary level treatment, whether or not federal funds are available.

In the early months of 1987, Congress passed a long-awaited update to the Clean Water Act and then overrode the President's veto of the bill. The new amendments to the Act provide $18 billion in federal aid to state and local governments for construction of sewage treatment facilities and $2 billion for related water pollution cleanup. Half of the construction funds will go into a new revolving loan fund which will be used in future years for construction funds when all federal assistance is removed.

Needless to say, the goals of the original Clean Water Act have not been fully reached. Major strides have been made, but in Massachusetts more than half the miles of major rivers have not yet reached their designated water quality classification. The question remains how cities and towns will comply with national and state goals for clean water.

The other important pieces of federal legislation for river protection include the **Safe Drinking Water Act**, the **Rivers and Harbors Act of 1899**, and the **National Flood Insurance Program**. The **National Wild and Scenic Rivers Act** can also provide a measure of protection in certain cases.

The Safe Drinking Water Act

was originally passed in 1974 (Public Law 93-523), and was amended in 1986 to stiffen the actions which may be taken by the Environmental Protection Agency to protect drinking water supplies. The act regulates toxins, chemicals and other substances which endanger drinking water in surface sources; it also covers groundwater (nearly half of all Americans obtain their water from a groundwater source) by protecting sole source aquifers or those which are the primary source of municipal water supplies and wellheads (the areas that recharge wells). The act also regulates underground injection of wastes into soil. Funds are provided for planning and implementation of this act, including the development of comprehensive protection plans via land use controls.

The Rivers and Harbors Act of 1899 authorizes the United States Corps of Engineers to prevent obstruction of navigable waterways and also regulates the discharge of refuse into these waters. The same legislation regulates dam and dike construction and establishes the boundaries of harbors. All navigable waters are covered including waters once used for interstate or international commerce. (In related responsibilities, the Corps of Engineers is charged with issuing permits for discharge of dredge or fill into navigable waters. Section 404 of the Clean Waters Act.)

The National Flood Insurance Program provides flood insurance coverage to landowners in flood-prone areas where towns have complied with federal guidelines for mapping and adoption of local flood plain zoning protections.

The National Wild and Scenic Rivers Act (Public Law 95-542 as amended) specifies a process by which Congress can designate a river as a national resource. A study must be carried out, plus a vote of Congress. The designation provides some measure of protection from federal dam construction projects on rivers.

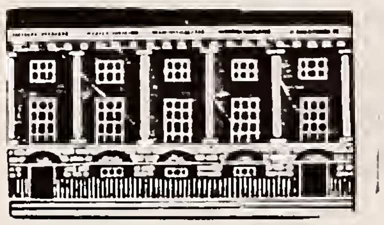
The state legislature has passed a variety of laws related to protecting rivers, water resources and related open spaces. Chief among these laws is the **Massachusetts Clean Water Act** (Chapter 21, section 43), a counterpart to the federal legislation. This law makes provisions for the state to help administer the national permitting system; to test and monitor for water pollution; and hold polluters accountable for point source discharges. It also requires permits for discharges into groundwater, an important extension of the federal law.

Two other important pieces of state legislation are the joint **Wetlands Protection** and **Wetlands Restrictions Acts**. The first prohibits dredging, filling or otherwise altering wetlands without obtaining a permit which assures no more than minimal damage. The second program allows state agencies to map vulnerable wetlands in priority areas and restrict further uses which could alter or harm those wetlands. (Chapter 131, section

40 and 40A; Chapter 130, Section 105.) The Wetlands Protection Act in particular relies on local enforcement to a large degree.

Additional legislation of interest includes the **Coastal Zone Management Act** which provides oversight of changes in coastal areas; the **Massachusetts Environmental Policy Act** (Chapter 30, Sections 61 and 62) which provides a review procedure for certain construction projects requiring state permits; the **Water Quality, Standards Segment Classification Act** (Chapter 21, Section 27); and the **Areas of Critical Environmental Concern** (Chapter 21 A, Section 2 (7)) which provides protection for fragile resources; and the **Scenic and Recreational Rivers Act** (Chapter 21, Section 17A) which provides a process for state designation of rivers as having special scenic and recreational value.

The Waterways License and Permit Program (Chapter 91) was passed to protect public rights on great ponds, tidelands and some specified rivers and streams (such as the Merrimack, and portions of the Connecticut) through a system of permits and licenses.



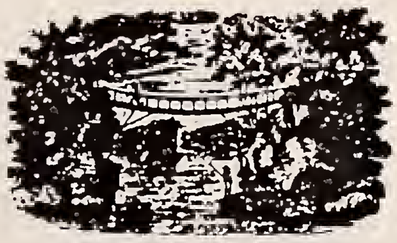
THE REGULATORS. The agencies at the federal level which are responsible for administering all federal acts include the Environmental Protection Agency (EPA) and the Corps of Engineers (COE) as well as the Federal Emergency Management Agency or FEMA. At the state level, key agencies are the Department of Environmental Quality Engineering (DEQE) which has four divisions specifically working on water quality issues; the Department of Environmental Management (DEM) which has divisions working on the Federal Flood Control Program and the Scenic Rivers Program; and the Massachusetts Environmental Policy Act unit in the Office of the Secretary of Environmental Affairs which handles the MEPA review process.

Locally, one of the most important regulatory agencies is the Conservation Commission which is mandated by state law and has primary regulatory authority under the Wetlands Protection Act; in addition, local planning commissions, boards of health, local water supply officials (if any), sewer commissioners (if any), hazardous waste coordinators, and selectmen, city councilors, aldermen or city managers all have significant roles to play.

More details about agency responsibilities and the roles of various officials appear in the following tables.

HOME RULE. Given the extraordinary range of powers that *may* be implemented by local elected and appointed officials, "home rule" can provide very effective protection of natural resources. Still, many of the 351 cities and towns in the Commonwealth have yet to implement or effectively exercise their powers. The resistance to the imposition of state authority is a long-held tradition in New England. The resulting "home rule" approach to governance can lead to fragmentary, and even conflicting, actions by local towns on situations (such as river pollution) which clearly affect more than one town, originate in more than one jurisdiction and can only be resolved by cooperative action.

The home rule options place tremendous responsibility on town officials and, ultimately, on individual citizens who may need to educate, encourage, and hold officials accountable to their mandate. Cooperation among citizens and town officials, as well as between towns, is crucial to the achievement of clean rivers and protected open space. Home rule offers an enormous opportunity for citizen participation in this process of facilitating cooperation and action at the local level.



LOCAL POWERS

The duties and responsibilities of local officials are spelled out in the tables below. Most of their powers, as described, are optional.

Selectmen and Mayor/City Council/Aldermen/City Manager

- Can establish groundwater protection standards and practices for departments and boards under their jurisdiction and can require regular reports.
- Can appoint citizens concerned about groudwater protection to town boards and committees.
- Can place and support articles in the town meeting warrant to establish town bylaws for hazardous materials control, wetlands protection, earth removal, and the creation of a recycling commission.
- Can seek grants for aquifer acquisition, salt storage sheds, and other appropriate programs, when funds are available.
- Can administer town lands under their jurisdiction to protect groundwater.
- Can accept conservation restrictions for the municipality.
- May appoint a hazardous waste coordinator and provide official support for a hazardous waste management program.
- Can act to abate a nuisance that may be injurious to public health if the health board fails to act.
- May serve as the special permit granting authority.
- Can serve, in towns, as health boards, conservation commissions, and water and sewer commissions if separate boards have not been established by a vote of town meeting.

Powers set out in M.G.L. Ch. 41

Boards of Health

- Can hire an agent to enforce state and lcoal laws and regulations.
- Can adopt regulations for any activity that might contaminate groundwater.
- Can regulate local use, transport, and storage of hazardous materials, including fuel (in cooperation with the Fire Dept.).
- May be able to limit use of herbicides and other chemicals over aquifers and recharge areas.
- Administer Title 5 (Environmental Health Code) governing installation and maintenance of septic systems. (Permits up to 15,000 gallons per day; DEQE for over 15,000 gpd.)
- Must approve plans for drainage in subdivision plans, can disapprove a subdivision plan or portion of a plan because of a threat to groundwater quality.
- Can require buildings that abut a sewer line to be hooked into it, even if they have septic systems.
- Must assign sites for "offensive trades," landfills, garbage dumps, and hazardous waste disposal.
- Have broad power to regulate "nuisances," including those that threaten groundwater quality.

Conservation Commissions

- Can acquire conservation lands (with approval of chief elected officials (CEOs) including aquifers and recharge areas; can apply for state and federal funding for land acquisition (with CEO approval).
- Can purchase or acquire by gift conservation restrictions on land important for groundwater protection (approval of CEOs and the Executive Office of Environmental Affairs required); can also hold agricultural preservation restrictions.
- May receive gifts of land and money (CEOs' approval necessary).
- May establish regulations for use of land under its control; can include measures to protect groundwater.
- Can develop local bylaws to provide additional protection to wetlands (and the groundwater associates with them); bylaws must be passed by town meeting or city council.
- May serve as the permit agency for earth removal applications.
- Can provide environmental education activities to the public.

Additional Functions and Powers specified in M.G.L. c.40, S8C spelled out in M.G.L. Ch.131 S40 (Wetlands Protections Act). Must be established by town vote.

Information Sheet #1

Local Water Supply Officials

- Are responsible for the development and maintenance of the public water-supply system.
- Set water rates; may set rates that cover all costs of delivery and encourage conservation.
- Can purchase or acquire by gift assigned to them by town meeting or city council.
- Must determine that the water supply meets state and federal drinking water standards.
- Can provide leadership for protection of aquifers and recharge areas.
- Can contract for studies to map and develop groundwater supplies.
- Can monitor quality of both water supplies and tributaries to supplies.
- Can urge CEOs to request DEQE to declare a water emergency for the municipality; if emergency is declared, can restrict the use of water and declare a building moratorium.
- Can urge CEOs to apply for grants for leak detection and repair.
- Can provide leadership for water conservation.

Optional Group established by town meeting; duties specified in M.G.L. Ch.41, S69B

Planning Boards

- Can plan for the "resources, possibilities, and needs" of the community, including groundwater protection; can develop a master plan and conduct other planning studies, including water-supply plans.
- Can serve as the special permit granting authority within zoning districts.
- Can develop and propose an official map governing the layout of roads and parks. (Protection of groundwater can be considered as the map is developed.)
- Must adopt regulations for reviewing subdivision plans and can include groundwater protection measures related to drainage, public ways, and public safety; can require extensive information about a proposed subdivision, including information about groundwater; may require construction bonds to ensure that drainage work is done properly.
- Must review all proposed zoning bylaws and amendments; can develop and recommend zoning and non-zoning provisions including site-plan-review bylaws, and environmental performance standards to control design of projects not covered by subdivision controls.

Powers specified in M.G.L. Ch. 41

SOURCE: Local Authority for Groundwater Protection, Groundwater Information Flyer #4, Massachusetts Audubon Society, July, 1984.

The Issues

WATER QUALITY. The specific goals of the National and Massachusetts Clean Water Acts are clear. The responsibility in the Commonwealth is shared by state authorities (DEQE) for permitting and discharge regulation and local authorities for preventative measures related to land use, zoning and local environmental protections. But there are some hidden pressures which have made it difficult to achieve the goals for clean water.

First is the dwindling funding available from the federal government for regional land use planning and construction of sewage treatment facilities.

Second is the tremendous, and in many cases unanticipated, growth in parts of the Commonwealth. Population growth as well as location of new industrial facilities has stressed the capacity of many municipal sewage systems or added significant burdens to soils and groundwaters in unsewered areas.

Third is the cumbersome process of determining need, then designing and constructing new treatment systems. DEQE estimates that it takes 12 years from the start of planning to the end of construction for a new wastewater treatment plant. The process is especially slow because the current state permits require municipalities to begin planning for expansion when the effluent discharge of the existing facility exceeds 80% of designed flow for 90 consecutive days. By the time this level has been reached, rapid growth can exceed 100% within months. It takes years to complete designs, locate funds (especially with cutbacks under the current administration over the past seven years) and then actually build a plant. By then, the level of pollution may have exceeded the original capacity for several years.

Without treatment facilities, growth can push pollution out of control. (See Figure 1, (1).) If there is already a treatment facility but no planning, the municipality becomes locked into a hopeless cycle of pollution, brief improvement as a new facility is finally built and then rapid pollution again. (See Figure 1 (2).) If a town or city has adequate planning (as the Clean Water Act envisioned) the planning process would anticipate the need for new capacity, and changes would be implemented before the permit levels were exceeded. (See Figure 1, (3).)

This idealized process, however, relies entirely on the construction of sewage treatment plants. Other options are available. Planning could, for instance, include strict land use regulations to limit new sources of pollution, as well as creative and comprehensive conservation and even water recycling programs. A policy of Natural Valley Storage—leaving crucial water absorption and recharge areas undeveloped to handle runoff—can reduce stormwater impact. A leak detection program and metering of water use can make a dramatic difference in volume of water used; however, such programs require funds for infrastructure (pipes and other facilities) improvements. A combined sewer overflow plan to separate sewage and stormwater system is similarly a capital-intensive alternative to expanded waste treatment in some situations.

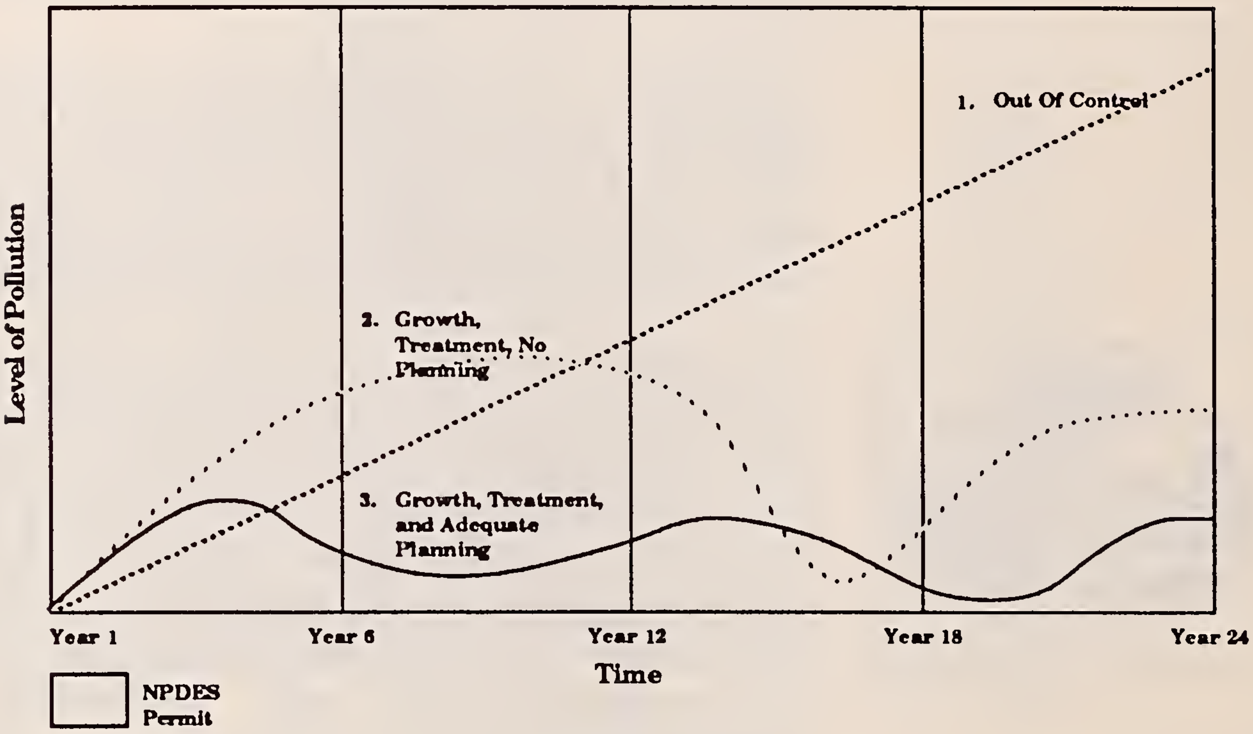


Figure 1.

Municipalities have for many years relied on subsidy based prices for water and sewer services. More communities are considering charging users full price for these services to offset the lack of adequate funds. In addition, Massachusetts has initiated a funding program to fill in the gap in federal funding—while these funds cannot replace federal funds, they should provide some of the sorely needed financial resources for towns struggling with the costs of treatment plant construction or upgrading.

Water conservation by households, business and industry can significantly reduce overall water demand, thereby reducing wastewater treatment. Local governments not only have the wherewithal to manage water supply and wastewater systems, but also the power to institute many local controls which can affect water quality. Land use controls reduce the introduction of toxics and pollutants into surface and ground waters. By utilizing the available controls at the local level, pollution can be curtailed.

With such additional programs operative, a community may be able to prevent the need for major construction and, indeed, move toward actual *improvement* of water quality.

THE LAND. In any community, even the most remote and quiet town, there may be competing uses for a specific piece of land. In a rapid growth phase, such as many Massachusetts cities and towns now face, competition may appear acute. When the real estate market becomes inflated, with land prices rising and construction proceeding at a breakneck pace, land which would have been considered marginal in the recent past is being sought, bought and put into sometimes inappropriate uses.

In most corners of the Commonwealth, such economic pressures are changing land use patterns. Some communities report growth spurts of more than 400%. Sleepy, small towns are doubling or tripling in size over a period as short as two years. While they are still not yet urban centers, these towns face unanticipated stresses on their soil and water resources as new construction beings additional roads (with increased runoff, salt/sand for snow control), septic tanks with leaching fields, and wells dug for water supply.

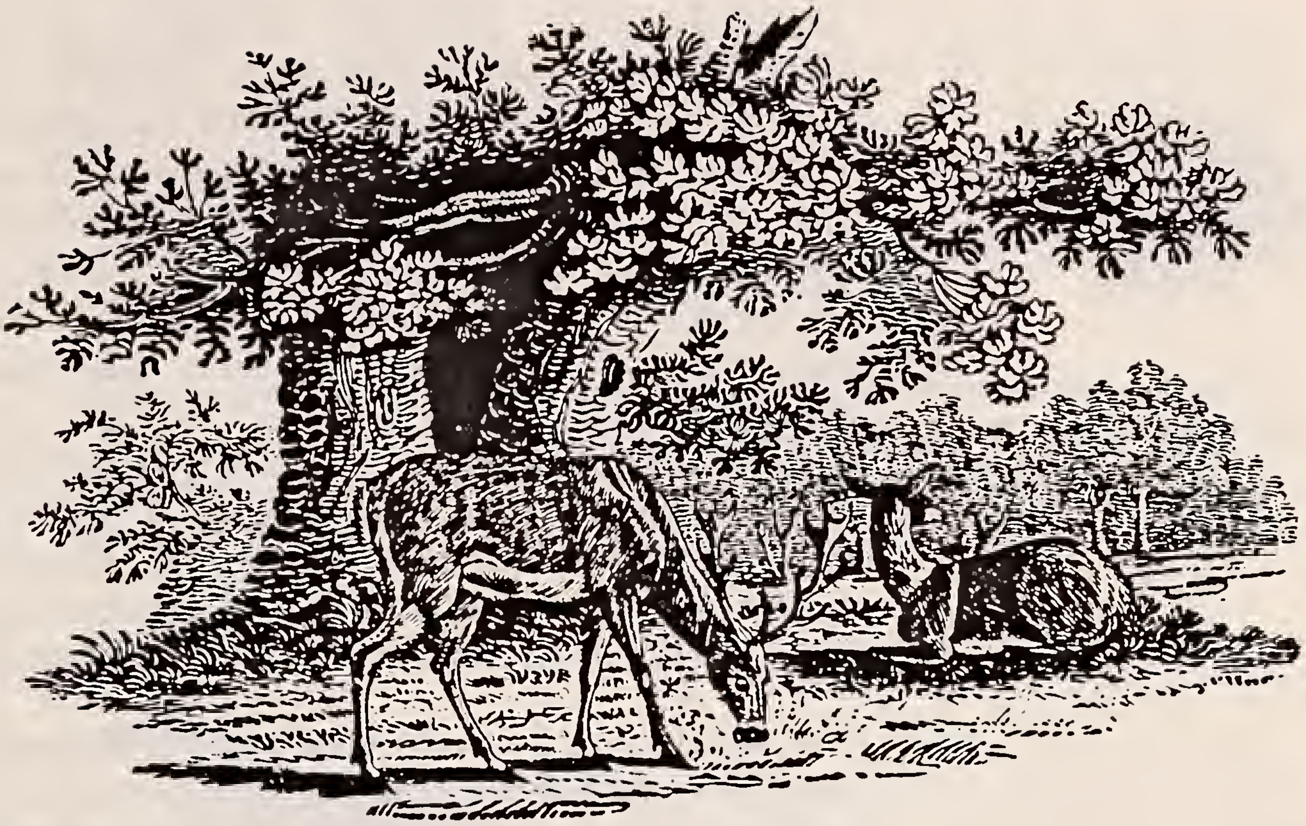
As the land scramble continues, parcels which have lain untouched for years are being put on the market. Prices are soaring. Cities and towns which took for granted "open space" (which was land merely "under-utilized" by current market standards) are facing a sudden depletion of open land, plus prices so high that purchases by local governments are inhibited.

In addition to the current pressures on land, historic zoning and land use patterns continue to affect open space and water resources. Many communities need to re-evaluate their zoning plans, and current as well as planned uses for land. A variety of allowed land uses may be incompatible with the concurrent desire to preserve open space and water resources.

The combination of ecological stresses and economic pressures on the land makes this particular period a crucial one for preservation of riparian lands. Cities and towns need to develop strategies for protecting selected open spaces despite the economic escalation; at the same time serious analysis of the carrying capacity of local lands for development should be made.

This workbook contains information about a variety of land use controls and suggestions on how citizens can help get these approaches to open space protection implemented. In addition, there are a variety of state and private programs to assist with the purchase of open space which are described. Working jointly, despite all the pressures, it is still possible to protect land which is crucial to the character and environmental health of your community.

PART II



Action Plan

Getting Organized

- Step 1: Set Goals—Envision the Results of Your Work
- Step 2: Identify Resources You Have to Work With
- Step 3: Establish Your Group

Gathering Information

- Step 4: Collect Land Protection Data
- Step 5: Collect Water Quality Data

Taking Action

- Step 6: Analyze Your Data—Build Action Plans
- Step 7: Keep Your Group Strong

Action Plan

SUMMARY: SEVEN STEPS. If you can envision the benefits that green riverway corridors will bring to your community, you are ready to take action to achieve your vision. This section of the **Adopt-A-Stream Workbook** outlines in detail an approach to organizing your efforts to adopt a stream and its surrounding lands. Some of you will be starting with the advantage of an organized group, perhaps already well-informed about the status of your stream and the issues related to protecting it (such as pollution sources, growth pressures, or environmental factors). Some of you are starting alone or with just one or two interested people. This workbook is organized from start to finish as if you are in the early stages of getting organized. But feel free to flip through and pick and choose those sections that fit your particular situation.

If, for example, you have a well-organized group and you have already established goals, you may want to skip the sections on setting goals and setting up a working organization. On the other hand, you may discover that it won't hurt to refresh your goals or to examine your organization to find out how to divide up tasks more effectively or how to avoid too few people doing too much of the work.

There are **seven key steps** to adopting a stream:

1. Envision the results goals; **2.** Identify your resources; **3.** Organize your group; **4.** Gather land information; **5.** Gather water quality data; **6.** Analyze data—build an action plan; and **7.** Keep your group strong.

These steps can be clustered into three stages: *Getting organized*; *Getting information*; and *Taking action.*

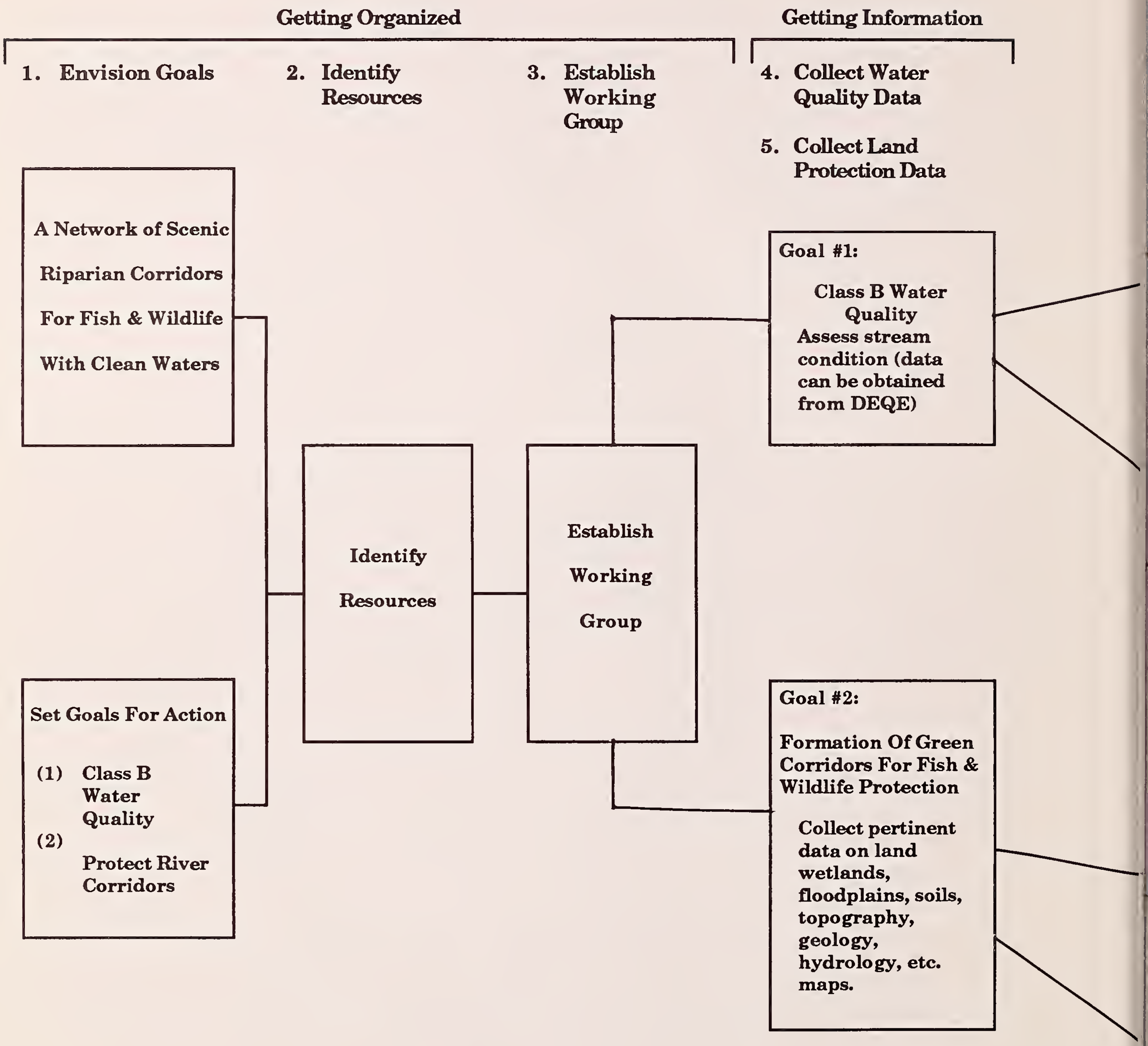
Getting organized: This process includes getting interested people involved in a strong, well-run work group; assessing the resources available to you through this work group and their contacts; and setting goals based on the vision you have of your river or stream resource.

Getting information: In order to plan effective actions for your group to take, you will need all sorts of information about your river and its surrounding area. It is helpful to break the data collection down by goal. For example, if your group has identified "Clean Water" and "Protecting Land" as its two key goals, it is easier to collect water quality data in one effort and land use and protection information in another effort.

Taking action: Effective action will require careful analysis of the information you collect; formulation of activities which your group believes will help reach your goals; and planning to use your group's members to carry out the actions you decide on. An important part of this action component is keeping your group strong which requires constant attention.

The following pull-out chart describes the flow of these tasks. The remainder of the workbook offers suggestions for carrying out these seven steps through the stages of getting organized, collecting information and taking action.

ADOPT-A-STREAM — ACTION PLAN FLOW CHART


Getting Organized
Getting Information
1. Envision Goals
2. Identify Resources
3. Establish Working Group
4. Collect Water Quality Data
5. Collect Land Protection Data
A Network of Scenic Riparian Corridors For Fish & Wildlife With Clean Waters
Set Goals For Action
(1) Class B Water Quality
(2) Protect River Corridors
Identify Resources
Establish Working Group
Goal #1:
Class B Water Quality
Assess stream condition (data can be obtained from DEQE)
Goal #2:
Formation Of Green Corridors For Fish & Wildlife Protection
Collect pertinent data on land wetlands, floodplains, soils, topography, geology, hydrology, etc. maps.

TAKING ACTION

6. Analyze Data/Develop Action Plan

7. Keep Your Organization Strong

A. Point Source Pollution Abatement and Prevention

1. Develop point source pollution profile of stream.
2. Develop pollution abatement prevention plan.
3. Approach and monitor major identifiable sources.
4. Obtain timetable for construction of treatment or abatement facilities, public and private.
5. Advocate for swift implementation of such facilities.
6. Monitor proper operation and maintenance of facilities.
7. Develop public information on point pollution and prevention.
8. Advocate timely review, planning and construction of additional facilities or alternatives as needed (not after needed).
9. Increase relevant local protection through land use or controls (see below).

B. Non-Point Source Pollution Abatement and Prevention

1. Develop non-point source pollution profile of stream.
2. Approach and monitor key sources (road, farms, etc.).
3. Develop public information on reducing non-point sources.
4. Develop model standards for voluntary compliance program for business, homeowners, industries.
5. Organize clean-up events to publicize need and remove some sources of pollution (trash, etc.).
6. Collaborate with town officials on bylaw changes and improvements (see below).

A. Purchase, Gifts, Easement Via Landowner Involvement

1. Map river corridor lands; identify and approach landowners to explain purchase programs and options.
2. Encourage and negotiate granting of conservation restriction to appropriate agency (Conservation Commission, DFWELE, etc.).
3. Acquire fee simple ownership of corridor lands for appropriate agency or organization.

B. Use of Local Bylaws, Regulations and Zoning

1. Analyze and check adequacy of water, environmental and conservation protection; rate town on "environmental check list."
2. Fill out matrix of applicable environmental protection tools for whole river basin.
3. Propose appropriate changes, additions for town bylaws; advocate for implementation.
4. Monitor enforcement of local bylaws and regulations.

Getting Organized

STEP 1: SET GOALS —ENVISION THE RESULTS OF YOUR WORK. To be effective, you need to have a clear vision of what you are working for. Once you start, it is easy to get sidetracked, caught up in details and hard work, or discouraged by roadblocks. If you have a clear image of how your river or stream can look, how it will benefit the community if it is cleaner and protected, and how it can be used by yourself and your neighbors, you will find it easier to deal with the shifts and changes that always come when you are organizing a community to solve a problem. When you become unsure of how to proceed, you can refer back to your group's vision and you will be surprised at how much that common image will help you determine just what your priorities or next steps at any given moment should be.

Try the following exercise to clarify your goals (which are statements of your vision).

Exercise #1 Have your group sit in a circle. With one person as "moderator" (and keeping time if necessary) ask each member of the circle to describe briefly how he or she envisions the river in five years and then ten years. Or, you can project ahead as far as when the town's children are grown up. Focus on the positive possibilities, what people would like, rather than dire predictions about how it will "really be". Let your imaginations go... can you imagine a swimming spot? Can you see natural wildflowers along the banks? Can you envision scarce wildlife, birds and fishes replenished and thriving? Have one person jot down the comments, using a newsprint pad and magic marker.

After this exercise is done, ask the group to continue some general discussion and see if any strong consensus emerges (that is, ideas that everyone agrees are great, that everyone can buy into). At the end of the meeting, ask someone to type up the notes and be sure that every member of your group gets a copy for future reference. Use these notes to orient new members of your group over time, and to help yourselves refocus whenever the reasons for your work get blurry.

If you have any artists in the group, see if you can get a sketch of some of the ideas. Keep these sketches handy to remind everyone of your long-term goals.

Exercise #2 Take another few minutes in your circle and ask each person to name some of the impediments or problems which they see as preventing their vision of the river from being realized. Have a note taker list all the problems on the newsprint pad. For the first round of contributions take all suggestions without discussion or comment to allow for the greatest flow of thoughts and ideas. After all first suggestions are up on the paper, spend a few more minutes seeing whether various items are related and can be categorized together. At this point the list should be consolidated.

Then take a few more minutes together to see if you can find general agreement on the most severe problems, or a natural order for working on the issues you have identified. Sometimes it will be quite clear at this point that some problems have to be addressed before others. You may see that there are logical parallel sets of issues to work on. (Remember that some goals can be pursued simultaneously.) At the end of this discussion you should have a clear idea of your *priorities*. This review will help you organize yourselves into working groups or committees as needed.

STEP 2: IDENTIFY THE RESOURCES YOU HAVE TO WORK WITH. Before you lay out the specific steps your group is going to take, it is helpful to know what resources you have to work with. You need to inventory several types of resources:

1. The water resources related to your stream (surface waters, fisheries, etc.)
2. The people resources in your group (skills, contacts, networks, etc.)
3. The technical resources your group can provide (photocopying, machinery, etc.)

Use the worksheets that follow to do these inventories. It is often very helpful to do this with the full group, since each person can contribute information and contacts which other people may not have.

WATER RESOURCES INVENTORY

Check the following water resources in your community.

☐ River(s)____________________

____

____

☐ Feeder ponds or lakes.____________________

____

____

☐ Related wetlands and floodplains.____________________

☐ Coastal Resources.____________________
  - ☐ Estuary.____________________
  - ☐ Salt Pond.____________________
  - ☐ Fish Runs____________________

☐ Fish or wildlife habitat.____________________
  - ☐ Cold water fishery.____________________
  - ☐ Warm water fishery.____________________
  - ☐ Waterfowl habitat.____________________
  - ☐ Shellfish fishery____________________
  - ☐ Endangered species habitat (Describe)____________________

☐ Does the river supply water for public use?____________________

☐ Is there a current or potential hydropower site?____________________

☐ Are there other impoundments?.____________________

☐ Recreational resources____________________
  - ☐ Swimming areas
  - ☐ Boat launches
  - ☐ Trails or other riverside uses
  - ☐ Scenic or historical sites
  - ☐ Marinas

PEOPLE RESOURCE INVENTORY

Please note any conditions which apply to your offering these skills to the group (such as hours of day, days of week, frequency, etc.)

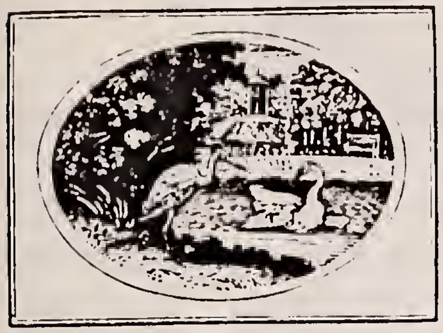
SKILLS YOU CAN OFFER	NAME	ADDRESS	ZIP	TELEPHONE #	CONDITIONS
Typing					
Bookkeeping					
Telephone Work					
Mailings					
Graphics					
Press of publicity					
Fundraising					
Speaking to local groups					
Research					
Writing					
Legal Skills					
Organizing Events					
Negotiating Skills					
Wildlife/fisheries skills					
Related Skills (specify)					
Computer Skills					
Real Estate Skills					
Scientific Skills					
Educational Skills					

TECHNICAL AND SUPPORT RESOURCES INVENTORY

List here all resources your group can provide: equipment, such as computer, typewriters, truck; typing service; canoes or small boats; meeting space; etc. This resource inventory can be added to after each project, as new people join and as new resources become available.

RESOURCE	NAME	PHONE	LOCATION	TERMS OF AVAILABILITY
Examples:				
Personal computer and printer	Jane Smith	333-3333	3 Old Smith Rd. Smithtown	Evenings 8 to 10; User must be oriented before use; Please schedule a couple of days ahead.

Worksheet #3



STEP 3: ESTABLISH YOUR GROUP. Once you have shared a vision with people who want to work on your river or stream, and you have taken inventory of the skills and resources you have to work with, it is time to get organized.

Here are some pointers to consider as your group gets started (or to compare to the way your group is already operating).

1. **Limit your specific goals and work plans to what can realistically be accomplished.** If you take on too much at once your group will inevitably become frustrated or discouraged. You can always add to your work plan as your group's size, experience and capability grow. Keeping your task manageable and measurable will help group morale, staying power and effectiveness.

2. **Rotate tasks whenever you can in order to share and build skills among all group members.** This includes chairing meetings, setting agendas, and all the myriad chores that go with keeping a group running well (mailings, phonings, meeting notices, note taking, and so forth). You may find some unexpected or hidden talents in your group; in any case you will be less likely to find yourselves stuck because the one person who always does a particular task is unavailable.

3. **In a few specific cases, where certain tasks require continuity and accountability, assign the work to one or at most two people**. This especially applies to financial tasks and in some cases to record keeping and similar tasks. With some experience, you will learn which tasks do not adapt to the rotation method.

4. **Whenever possible work in pairs or small groups.** Using a partner system will prevent burnout, encourage people to learn from one another, spread work more fairly and generally keep up morale. This is especially important for assignments which people agree to do between meetings.

5. **Draw on the internal resources of the group.** Watch carefully to see who in your group has particular skills. You may discover that someone has a knack for meeting management or agenda setting. Ask that person to share ideas on those skills. Use your resource inventory to assign people to tasks and to partners. If one person can take the lead in a task but does not have all the skills, ask

a second person with those skills to be the "partner" who can be called on as needed but not have to take a major role.

6. **Respect people's limits.** Most people work full-time or have a variety of family and community responsibilities. Be aware that if you set meeting times at the supper hour, or consistently on weekends, you are forcing people to choose between responsibilities and concerns. At every chance, try to build in some enjoyable events to which people can invite family and friends. This will help your members integrate their river work more fully into their lives and make it more likely that they can continue putting energy into your group.

7. **Make clear assignments.** Make tasks manageable, with clear timelines. Everyone should get a task at each meeting, no matter how small, so that you set the precedent for spreading work evenly. People will naturally have cycles when their time is more or less available, but they can almost always make a phone call or some other small task. Keep a clear list of assignments so that progress can be charted from meeting to meeting.

8. **Set up committees.** Groups can utilize two basic types of committees (which are nothing more than small working teams—two people can constitute a committee). Some ongoing tasks require **standing committees**. Membership and outreach, finances and fundraising, and long-term tasks such as monitoring water quality or working on land protection are good candidates for standing committees. **Special committees** are good for short-term or periodic work. It is important to set clearly defined tasks for these committees to accomplish. A spring clean up campaign or public education program for River Month would be good purposes for special committees.

9. **Keep your organization open to new people and ideas.** Check every so often to be sure that your group does not suffer from "founder's disease," a common malady of groups which keeps a group closed and unavailable to new members because only the old members know what is going on and tend to take on all the tasks. Actively work on ways to involve new people, make them feel welcome and included in the group.

10. **Reassess your organization periodically.** Take the time once or twice a year to review your goals, your membership, your workload and the progress you've made on specific tasks. Are there specific roadblocks you can identify? A key person who is too overworked? Too many simultaneous projects? Too few new members? Lack of understanding of river issues in your local communities? See if you can identify ways to remedy these difficulties. It may just take a pause and some group attention to make a major difference in your effectiveness.

11. **Review your formal options for organization—Incorporation, non-profit, tax exempt, etc.** There are a variety of ways that groups can become formal organizations in the eyes of state and federal governments. It is important to understand these options and choose the one which suits your group and its purpose best. It is equally important not to get stuck trying to figure out all the tiny details of the incorporation process. Any good lawyer (perhaps there is one in your group) can draw up a set of bylaws and explain how to file with the Commonwealth and the federal government. You must also learn the required set of reports and minor annual fees which are required. Tax exempt status is valuable because you do not have to pay taxes on payments to employees. Federal tax-deductible status (section 501 (c)(3)) is valuable because donations to your organization allow tax advantages for the donor. It takes some time to obtain the official IRS status as tax-deductible, so it is wise to allow sufficient lead time from when you need to be raising funds which require your group to have such a status. There are many groups you may turn to for samples of bylaws and guidance on corporate structure. Take advantage of these, and do not spend the time reinventing language and structure which you can easily borrow.

Gathering Information

To develop and carry out your work plan, you will need lots of information. Much of it is available through state agencies or existing advocacy groups; some of it you may have to collect, such as specific land ownership information. You need information to carefully analyze your rivers situation and to select the action steps which will make a difference.

One approach to collecting information, a method to make the data collection process somewhat manageable, is to organize your data collection by goal. For instance, if your two major goals are "improving water quality" and "protecting riparian lands" you can break your information collecting into two main branches. An outline for collecting information related to these two goals would look like this:

GOAL	INFORMATION TO COLLECT
Land Protection	1. Maps of physical and ecological characteristics such as: Topography Soils Bedrock geology Groundwater hydrology Vegetation Endangered species and habitat Wetlands Flood plains 2. Maps of land ownership 3. Maps of land uses and zoning (potential use) 4. Check list of local land-use/ environmental protection bylaws.

GOAL	INFORMATION TO COLLECT
Water Quality Improvement	1. Biological survey 2. Chemical analysis 3. Point source pollution profile 4. Non-point source pollution profile 5. Other water quality data

Before you begin the process of collecting data yourselves, your group should make a thorough survey of information which is already available. Information Sheet #2 describes sources of data on land and water. Using these materials can save tremendous amounts of time; even if the reports are somewhat out of date, it may take less time to update than to start from the beginning.

Information Sheet #2

SOURCES OF DATA ON LAND AND WATER

Where to Get Information for Stream Protection

Land Information

Sources you can use	Where available
U.S. Quadrangle Topographic Maps Maps show topography, lakes, rivers, streams, wetlands, buildings, roads gravel pits, gaging stations at time of printing.	U.S. Geological Survey (USGS) Map Distribution Federal Center Bldg. 41 Box 25286 Denver, CO 80229 or local map or sports stores
U.S. Geologic Quadrangle Maps Maps show location of sand, gravel, various deposits and sediments. Commentary included on landforms, soil profiles and significant patterns and changes in the area.	USGS (see above)

All of the following are available at town or city hall offices of selectmen, Town Manager, Planning Board, Assessors, Conservation Commission.

Floodplain Maps Maps show 100 year and 500 year flood boundaries in a town or city for flood insurance purposes published by Federal Emergency Management Agency (FEMA) for the cities and towns.	Flood Hazard Management Program Division of Water Resources Department of Environmental Management 100 Cambridge Street Boston, MA 02202 (617) 727-3267, or call 1-(800)-638-6620
Water Supply Atlas & Maps Four overlay maps used with USGS topographic maps show (1) surface drainage basins, (2) permitted discharges, (3) location of public drinking water supplies, and (4) potential sources of contamination (land fills, salt storage, junk yards)	Division of Water Supply Department of Environmental Quality Engineering One Winter Street Boston, MA 02108 (617) 292-5913

Soil Survey Maps Maps show soil types and indicates limits of use.	Soil Conservation Service (SCS) U.S. Department of Agriculture (USDA) 451 West Street Amherst, MA 01002 (413) 256-0441 or County Field Offices
Zoning/Land Use Maps Maps show town areas designated for specific uses (whether or not implemented.)	Town or City Hall Town or City Planning Board Regional Planning Agency
Assessor's Maps Maps show house lots and land ownership.	Town or City Assessor's Office
Open Space and Recreation Plans plans show open lands and recreational resources and provide basis for prsent and future use and management of resources.	Town or City Planning Board Conservation Commission Division of Conservation Services Exec. Office of Env. Affairs
Riverway and Greenway Plans Plans include maps of lands along rivers and location of special resources and pollution problems. Not all areas have had plans done.	Town or City Planning Board Conservation Commission Regional Planning Agency

Water Information

The Department of Environmental Management publishes a directory of State, Federal, and Regional Water Planning and Management Agencies. A copy can be obtained from:

DEM-Division of Water Resources
100 Cambridge Street, Room 1304
Boston, MA 02202
(617) 727-3267

FOR WATER POLLUTION INFORMATION: general data and background on dischargers, enforcement:

STATE	**Department of Environmental Quality Engineering** Division of Water Pollution Control 1 Winter Street Boston, MA 02108	(617) 292-6983
	• Water Quality Research Section, River Basin Planning Program Westview Bldg., Lyman School Rt. 9 Westboro, MA 01581	(617) 727-6983
	Division of Environmental Monitoring Lawrence Experiment Station 37 Shattuck Street Lawrence, MA 01843	(617) 682-5237

DEQE Regional Offices
(see list at end of this section)

	Department of Environmental Management Division of Waterways 100 Cambridge Street –19th floor Boston, MA	(617) 647-8778
FEDERAL	**US Army Corps of Engineers** New England Division 424 Trapelo Road Waltham, MA 02254-9149	
	Public Affairs	(617) 647-8778
	US Environmental Protection Agency (EPA) Region 1 JFK Federal Building – Government Center Boston, MA 02203	
	Public Affairs	565-3424
	Water Management Division	
	• Compliance Branch	565-3484
	Industrial Permits	565-3512
	Municipal Permits	565-3516
	Permit Compliance	565-3493
	Permit Processing	565-3525
	• Municipal Facilities Branch	565-3560
	Grants	565-3580
	Technical Assistance	565-3586
	• Water Quality Branch	565-3531
	Planning & Standards	565-3525
	Environmental Evaluation	565-3555

FOR WATER SUPPLY INFORMATION: general information, reservoirs, aquifers, wells, drinking water treatment and regulation:

STATE **DEQE**
Division of Water Supply 292-5770
1 Winter Street
Boston, MA 02108
- Groundwater Unit 292-5529
  292-5653
- Water Supply Construction 292-5780

DEQE Regional Offices
(see list at the end of this section)

Department of Environmental Management DEM
Division of Water Resources 727-3267
100 Cambridge Street, 13th floor
Boston, MA 02202

Massachusetts Water Resources Authority (MWRA)
Charlestown Navy Yard
100 First Avenue
Boston, MA 02129
- Public Affairs 242-6000
- Water Supply Citizens Advisory Committee (413) 586-8861
- Sudbury Citizens Advisory Committee (617) 369-6878

Metropolitan District Commission (MDC)
20 Somerset Street
Boston, MA 02202
- Watershed Management 727-6267

FEDERAL **US EPA**
Water Management Division
- Water Supply Branch 565-3610
  State Water Supply Programs 565-3669
  Tehnical Assistance Section 565-3669
  Office if Groundwater Protection 565-3597

US Geological Survey (USGS)
Water Resources Division 223-4521
150 Causeway Street, Suite 1001
Boston, MA 02114-1384

FOR WETLANDS INFORMATION:

STATE	**DEQE**	
	Division of Wetland Protection	292-5518
	1 Winter Street	
	Boston, MA	

DEQE Regional Offices
(see list at end of section)

FEDERAL	US Army Corps of Engineers	
	Public Affairs	647-8778
	Operations Division	647-8320
	• Regulatory (Permits)	647-8338
	US EPA	
	• Environmental Evaluation Section Dredge/Fill Wetlands (Section 404)	565-3356

FOR FLOODPLAINS INFORMATION:

STATE	**DEM**	
	Division of Water Resources	727-3267
	• Flood Control Program	
	• Floodplain Mgmt. & Assistance Program	
	Office of Planning and Development	727-3160
	• Dam Safety Program	
FEDERAL	**US Army Corps of Engineers**	
	Planning Division	
	• Flood Control	647-8532
	• Basin Planning	647-8500
	Operations Division	
	• Flood Control/Recreation	647-8478
	Federal Emergency Management Agency (FEMA) Region 1 JW McCormack Post Office Bldg., Room 442 Boston, MA 02109	
	Natural & Technological Hazards Division (National Flood Insurance)	223-2616

DEQE Regional Offices

Metropolitan Boston/Northeast Regional Office (617) 935-2160 or
5 Commonwealth Avenue (617) 727-5194
Woburn, MA 01801

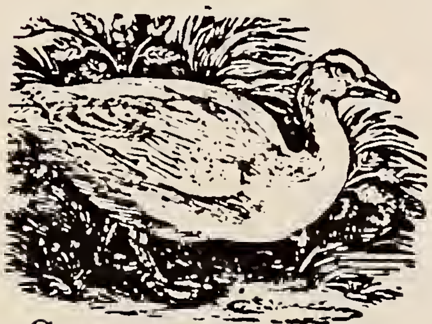
Southeast Office (617) 947-1231
Lakeville Hospital
Middleboro, MA 02346

Central Office (617) 792-7650
75B Grove Street
Worcester, MA 01605

Western Office (413) 785-5327
State House West
436 Dwight Street, 4th Floor
Springfield, MA 01103

STEP 4: COLLECT LAND PROTECTION DATA.

To find out what trends are occurring in the area around your river, what characteristics mark the land, what factors are shaping the physical and economic shape of the region, you will need to collect and review quantities of information. Much of the information can be found in existing maps and reports, with site visits to verify actual land uses or changes by direct observation. The particular analysis your group makes of all this information will direct your on-going work. What land is still available for protection? What approaches will help secure these sites? What range of actions—from purchase to town bylaw changes—can be instituted to protect river lands? The following information sheets and worksheets offer suggestions for collecting and using this land data.



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MAPPING LAND INFORMATION

An easy way to store the information you collect about the land adjacent to your river or stream is to put it on a map. This visual method of recording data will help you perceive trends, situations and factors in your river area which may not be readily apparent through written facts and figures.

Here are some pointers for mapping the land information you collect.

1. Start with a **Base Map**, that is, a map which presents the basic area you are interested in, with certain basic information depicted: roads, buildings, rivers and streams, ponds and other water bodies, railroads, and other surface features of the land. The best base maps are clearly drawn, consistent and have simple depictions of features. Often the U.S. Geological Service (USGS) maps are used as base maps. They come in "quadrangles" or "quads" which cover specified areas. Quads match up edge to edge; you may need more than one quad to cover your entire area of interest. USGS uses two scales — one inch to 25,000 feet or one inch to 15,000 feet. Be sure that all your quads are in the same scale to avoid confusion.

2. Determine the other features which you want your maps to describe. Consider: floodplains, wetlands, aquifer recharge areas, slope or terrain (hills), dams, town wells, dumps, wastewater treatment plants, salt storage sites, habitat for endangered species, recreational lands and open space (including boat ramps, private parks, wildlife preserves), zoning and current land uses (particularly business or industry which could be likely contributors to stream pollution), and property boundaries with landowners' names. Since all of this information on one map may become illegible, you should choose the information of most value to you to place on your base map. Other information can then be prepared as overlays or companion maps.

3. Select the types of **overlays** you want for your base map. You may choose to put all zoning and current land use information on one map; all water related data (such as aquifers and wetlands) on another. It is easiest to put overlays on transparent sheets of plastic (called mylar) or strong tracing paper. Another approach is to make several copies of your base map and transfer the data to companion maps.

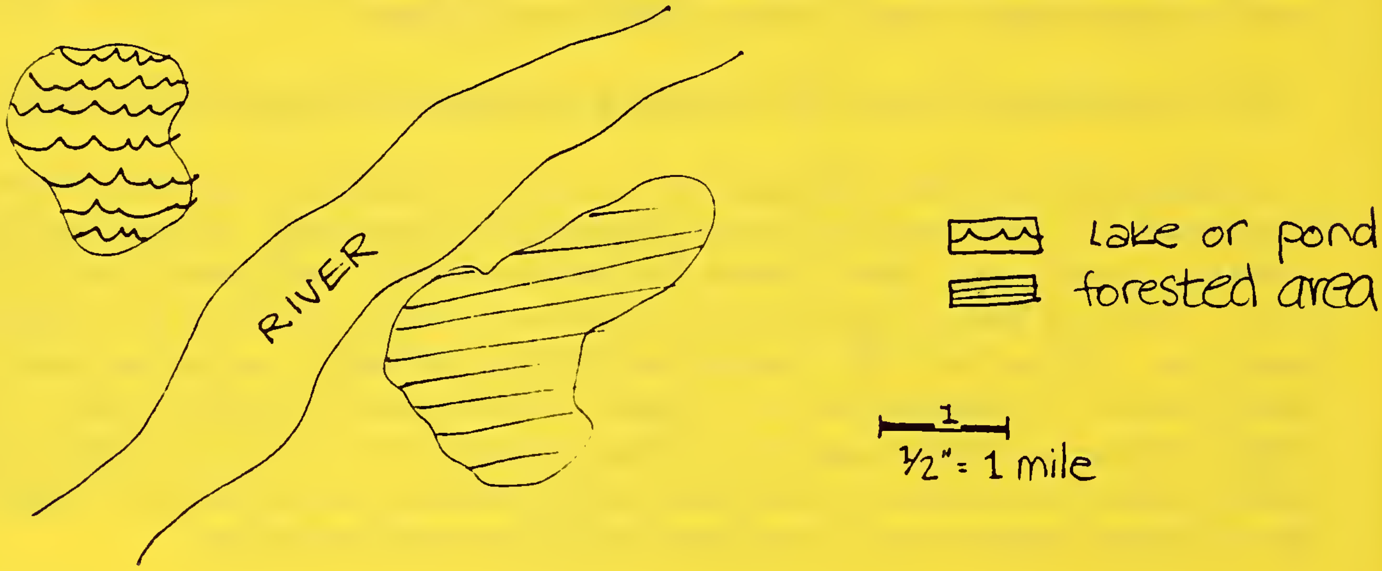
4. Enlarging the part of your base map where your river is located can be very helpful. Maps can be enlarged by photocopy machines, giving you a more detailed rendition to display your data on. Make several copies for the different types of data that you want to map.

5. Remember that if you plan to make copies of working maps that colors will not show up. It is wise to use patterns and cross hatches, as well as colors, for maximum visibility in copies.

6. If you've never used a topographical or hydrological map, ask your town planners, district offices of state agencies or your regional planning agency for

orientation. Often the source of the maps can give a quick explanation about how to read them.

7. Be sure to mark your "legend" (notes about what symbols, colors and patterns represent) right on the map to assist users. Make an easy to read graphic notation showing scale, i.e. 1/2 inch equals 1 mile.



8. To map land ownership information you may find an assessor's map to be a better base map. [If there is a town wide assessor's map that delineates property boundaries, enlarge the portion near the river by photocopy machine.] Number each parcel along rivers; then use the files and maps in the assessor's office to record information about the owner, parcel size, valuation, and other pertinent information on note cards. Label each separate parcel with a number, corresponding with the number on your note cards.

The Audubon Society has prepared some excellent information about mapping, particularly water resources. References are provided in the Resources appendix at the end of the **Workbook**.

The following Worksheet (#4) is designed to help you rate your town's ability to protect rivers. The various bylaws, regulations and other methods of protecting river lands are listed so you can check off those which your town is taking advantage of. Your town's "score" will help you develop an action plan for implementing other protections through local government or agencies. The "Matrix" Worksheet (#5) provides a format for assessing a whole river basin in terms of protections utilized by each community along the river. By completing this table, you will be able to determine which towns need most help to increase protections.

K King-fisher. k

HOW DOES YOUR COMMUNITY RATE IN RIVER-RELATED PROTECTIONS?

In Massachusetts, local communities have significant powers for protecting water resources such as rivers. Rate your town below by checking off the items that exist through town ordinance, regulations or administration. Some of the items on the list apply to water resources other than rivers, but the close interconnection of many water resources makes these approaches of interest.

There are three main approaches to protecting rivers and related water systems: **(1) Regulatory**; **(2) Administrative and Technical Assistance**; and **(3) Incentive Approaches**.

Regulatory Approaches

☐ Floodplain zoning
☐ Wetlands protection zoning
☐ Subdivision Regulations providing for care of aquifers, drinking watersheds, recharge areas, shorelines
☐ Bylaws providing for non-zoning protections of wetlands
☐ Bylaws that allow for cluster development, planned unit developments, transfer of development rights and other methods that reduce development stress on riverway lands
☐ Board of health regulations strictly regulating septic systems under Title V of the State Sanitary Code
☐ Underground (oil or chemical) Storage Tank Bylaw

Administrative and Technical Assistance Programs

☐ Does your community have a specific planning process for water resources and related issues (such as growth management)?
☐ Does your community have maps of the river and surrounding lands and related wetlands?
☐ Does your town have a land acquisition program to purchase or otherwise protect lands along the river or related wetlands?
☐ Does your town have an approved open space plan so that it can take advantage of state "Self-Help" funds through Conservation Services?
☐ Does your community have a coastal zone plan (if you have coastal areas)?
☐ Does your community make use of its regional planning agency for technical assistance on environmental bylaws, mapping, planning?
☐ Does your community have an official water conservation program explaining the importance of reducing water use in order to reduce the need for additional treatment and water supply facilities?
☐ Does your town actively encourage industry and business to conserve and recycle water?
☐ Does your community have adequate staffing, funding and tools (such as maps, data files, etc.) to carry out the mandates of key departments?
☐ Does your town supply funding to key boards and commissions such as the Planning Board, Board of Health, and Conservation Commission?

☐ Does your community have clear guidelines to reduce use of salt on roads, particularly riparian lands and wetlands?

Incentive Programs

☐ Does your community actively promote preferential assessment or tax exemptions for protected lands or desirable uses such as agriculture, forest lands or recreation lands?*

☐ Does your conservation commission or other community body actively seek conservation easements or gifts and donations along rivers?

☐ Does your town actively work with state agencies or private land trusts or conservation groups to purchase open spaces, particularly riparian lands and wetlands?

Scoring:	**5 points per checked box**	
95 to 100	Excellent	(A)
90 to 95	Nearly Excellent	(A-)
85 to 90	Very Good	(B)
80 to 85	Good	(B-)
70 to 80	Passable	(C)
60 to 70	Barely Passing	(D)

With thanks to Gregor MacGregor, Esq.

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* Chapter 61A (farmland), Chapter 61 (forest lands) and Chapter 61B (recreation land)

Worksheet #5

RIVER PROTECTIONS IMPLEMENTED

Watershed Summary

Protections Implemented	Town/City	Town/City	Town/City	Town/City	Town/City
Floodplain zoning (MGL Ch. 40A: (Zoning Ord. Bylaw)					
Wetlands Protection • Ch. 40-A (Zoning Ord. Bylaw)					
• Ch. 40-§21 (Town Bylaw)					
• Ch. 131 §40A (Wetlands Protection Act)					
Subdivision Regs. (Ch. 41 Planning Board) • Protecting Water Resources					
Subdivision Zoning Regs. (Ch. 40A, §§2 & 9					
• Cluster Zoning Open Space Transfer					
• Planned Unit Develops					
• Transfer of Development Rights					

Protections Implemented	Town/City	Town/City	Town/City	Town/City	Town/City
Underground Storage Tank Bylaw					
Septic System Regs. (State Sanitary Code, Title V) G.L. III, §31, Health Boards)					
Groundwater Protection Bylaws					
Environmental Impact/Site Plan Review • Ch. 40A					
Open Space Acquisition Plan to Protect River					
Coastal Zone Plan (if applicable)					
Water Conservation Program					
Reduced Road Salt Program					
Land Transfer Bylaw					

STEP 5: COLLECTING WATER QUALITY DATA.

To determine the general health of the stream system, you will need to assess:

1. *The overall level of water quality (pollution profile from existing information);*

2. *Types of pollution or land use degrading the water and banks;*

3. *Range of life forms supported.*

Basic data on individual stream segments include: appearance—color and surface condition; odor; nature of the banks—grassy, steep, shaded, etc.; flow characteristics; types of plants and animals—fish, mammals and insects; and land use along the banks.

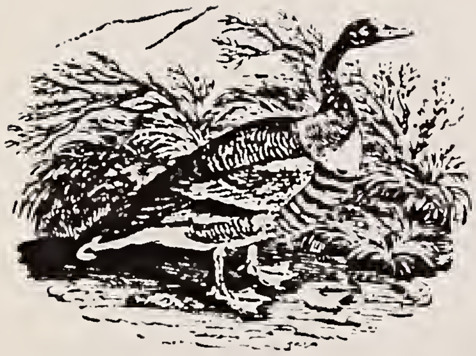
In all areas of the state, major rivers and streams have been extensively studied by the Department of Environmental Quality Engineering. Their River Basin Planning Program has analyzed water samples at locations all along rivers to determine water quality. They may also have sampled sediment and fish of the river to determine whether, over a long period of time, pollutants have accumulated in the river bottoms and are contaminating animals and plants through the process of bioaccumulation. These reports also summarize the factors which may be affecting the river's ability to meet standards necessary to protect its officially designated best use for boating, fishing, swimming or drinking.

There are two types of pollution which can cause a river *not* to support its best use—**point** or **non-point sources**. Point sources can be most easily described as pipes from dischargers such as industries or sewage treatment plants. Point sources are regulated under the Clean Water Act often restricted in amount of flow, types and amounts of pollutants which may be discharged, and reported to the state and federal environmental agencies.

Non-point sources are indirect discharges—uncontrolled runoff from different land uses. Examples of non-point sources and types of pollutants include: parking lots and stormwater sewers contributing litter, oil and animal wastes; agricultural lands contributing chemical fertilizers, pesticides and soil erosion from plowed fields; construction, logging or mining sites contributing eroded soil; hazardous waste and garbage landfills, and failing septic systems contaminating groundwater which drain to nearby surface water streams. Because of the indirect and intermittent nature of non-point sources pollution, most are not regulated, or specifically sampled. In some streams and stream segments though, non-point sources are a significant factor in non-attainment of water quality to support best uses.

While much of the technical data that you need to plan, organize and mobilize people already exist, there are advantages to obtaining some of the information directly in the field. Sources of potential non-point pollution can be best identified in the field. By getting people out to see the river and by observing the conditions directly, your group will have a much more vivid picture of their purpose, the problems and potential of your stream. A stream walk is a good "hands-on" approach for getting people interested. Such an informal survey, however, will not provide all the data and information you need. Agencies and other organizations will help provide the complete data base for your work.

The following set of worksheets and information sheets provides several approaches to surveying the health of your stream.



Worksheet #6 **(Stream Walk Survey)** is an inventory form for the easily observable physical aspects of the stream channel, banks and adjacent land uses. All these things may be factors or indicators of stream health. Using this information you can identify localized problems and propose local solutions.

Information Sheet #4 **(Unusual Colors & Odors)** provides background on what some of the colors, odors and land uses you've identified might tell about your stream and its need for protection. Information Sheet #5 (Where to Report Evidence of Pollution) explains what to do with the evidence you find.

Information Sheet #6 **(Pollution Profile)** provides a format to organize some of the available information about sources of pollution, and lists sources of information related to monitoring dischargers.

Worksheet #7 **(Biological Stream Survey)** covers methods for sampling life forms to indicate the biological health of the stream.

Worksheet #6

STREAM WALK SURVEY

This survey form provides a checklist for a number of physical characteristics and other indicators of stream health. Remember that your stream may differ from stretch to stretch; use a separate copy of the checklist for each stream or segment carefully noting the beginning and end points of each segment you observe. Also, conditions may vary noticeably with the time of year, level of stream flow, and other seasonable variables. You may want to sample more than once; if so, be sure you keep copies of each survey to compare to subsequent observations that you make.

Your group may not contain professional scientists. Don't worry about making rough estimates or "unscientific" observations. General and informal data will still be very valuable for your purposes.

Stream ______________________________ Date ____________________________________

Temperature ________________________ Segment landmarks ________________________

Water Appearance:

- ☐ scum
- ☐ foam
- ☐ muddy
- ☐ clear
- ☐ milky
- ☐ colored sheen (oily)
- ☐ brownish
- ☐ other

Stream Bed Coating:

- ☐ orange to red coating
- ☐ yellowish coating
- ☐ black coating
- ☐ brown coating
- ☐ none

Odor:

- ☐ rotten egg odor
- ☐ musky odor
- ☐ none

	Good covering	Fair covering	Poor covering
Covering	(70%-100% of bank soil covered by plants, rocks and logs)	(30%-70% of bank covered by plants, rocks and logs)	(less than 30% of covered by plants, rocks and logs)
Stream bank	☐	☐	☐
Top of bank	☐	☐	☐

Stability of stream bed:

Did the bed sink beneath your feet in ☐ no spots, ☐ a few spots, ☐ many spots

Width of Study Area:
pool section____________________ riffle section____________________

Depth of Study Area:
pool section____________________ riffle section____________________

Speed of Stream's Flow____

Land Use Profile

Type of development along shore

☐ urban
☐ suburban
☐ rural
☐ agricultural
☐ industrial
☐ commercial
☐ residential

Presence of

☐ discharge pipes (I)
☐ construction activity (I,C,R)
☐ pasture (A)
☐ cultivation (A)
☐ landfills (I)
☐ mines (I)
☐ quarry (I)
☐ logging operations (A)
☐ lawns (R)
☐ park/open space (R)
☐ parking lots (I,C)
☐ highways (I)

I=Industrial or infrastructure
C=Commercial
R=Residential
A=Agriculture

Make a simple diagram to note where you can identify land uses and types of pollution.

UNUSUAL COLORS AND ODORS IN WATERS
Evidence of Point and Non-point Sources

Condition	Possible Cause
Muddy Water	Erosion of soil in upstream area; in tidal waters it could also be caused by high winds.
Greenish Color	Microscopic plant cells called algae. Algae growth may be caused to exceed normal limits due to excessive amount of nutrients entering the water. Nutrient sources include: fertilizers, pet waste, grass clippings, leaves, etc.
Yellow-brown to dark brown water	Acids released from decaying plants. Naturally occurs each fall when dead leaves collect in the stream. Also common in streams, draining marsh or swampland.
Orange to red coating on stream bed	Results from bacterial action upon iron. May indicate a high erosion rate or industrial pollution.
Colored sheen on water surface	May indicate oil has entered the stream, particularly if there is water surface also an oily odor.
Foam	When foaming occurs in only a few scattered patches and is less than 3 inches high and cream-colored, it is probably natural. If the foaming is extensive, white in color or greater than 3 inches, it may be due to detergents entering the stream.
Rotten egg odor	Indicates sewage pollution. Odor may also be present in marsh or swampland.
Yellowish coating on stream bed	May indicate polluted water draining from a coal mine.
Musky odor	May indicate presence of untreated sewage, livestock waste, algae or other conditions.
White cottony masses on stream bed	Could be "sewage fungus." The presence of this growth indicates sewage or other organic pollution.
Blue-green algae	Could indicate sewage or other pollution if growth is excessive.

WHERE TO REPORT EVIDENCE OF POLLUTION

The first people to contact when you see evidence of pollution are your local government officials—Conservation Commissions, Boards of Health, Selectmen and Town Police. They can respond most quickly, will know the location and may know something about the condition.

When contacting a local or state agency concerning pollution or fishkills, record the time of the observation and the call, name of person contacted and whether the agency made a verbal commitment to investigate the incident. Give all information available including facts and suspicions on what you suspect caused the pollution or fishkill.

Depending on what you perceive to be the danger, contact the following agencies.

For Sewage, Hazardous Wastes or Oil Spills, call DEQE Regional Offices between 8:45 a.m.- 5 p.m.

Northeast Region (Woburn)	(617) 935-2160
Southeast Region (Lakeville)	(617) 947-1231 x 680
Central Region (Worcester)	(617) 792-7650
Western Region (Springfield)	(413) 784-5327

On weekends, holidays and off-duty hours, call (617) 566-4500, the State Police Officer who will relay message to DEQE.

For Fishkills, call FWELE Regional Offices between 8 a.m. - 4:30 p.m.

Northeast Wildlife District (Acton)	(617) 263-4347
Southeast Wildlife District (Buzzards Bay)	(617) 759-3406
Central Wildlife District (West Boylston)	(617) 835-3607
Connecticut Valley Wildlife District (Belchertown)	(413) 323-7632
Western Wildlife District (Pittsfield)	(413) 447-9789

On weekends, holidays and off-duty hours, call 1-800-632-8075, Division of Law Environmental Enforcement of FWELE.

For Pesticide Problems, call the Department of Food and Agriculture, Pesticide Bureau, between 8 a.m.- 5 p.m. at (617) 727-2864.

POLLUTION PROFILE

Reports, file folders and computer print outs contain important information on the health of your river. Water sampling results and point source discharges for your adopted stream can be gathered from the Massachusetts Department of Environmental Quality Engineering (DEQE) and the U.S. Environmental Protection Agency (EPA). This information is public and you have guaranteed access to it. This information will turn up problems in need of attention by local river activists that won't be obvious from a walk along the shore. Many toxic pollutants are odorless and colorless. They may be concentrated in bottom sediment or accumulated in fish. Many discharge pipes are below the water surface and away from the shore.

The first (and most general) information to collect is a summary of basin water quality and whether it is suitable for its designated best use for drinking, swimming or fishing. "Appendix III: Basin Segment Information" from the DEQE Annual Report on Water Quality, contains maps of the 32 major drainage basins in the Commonwealth. The associated tables provide a summary of best use classification segment by segment and identify problems of tributaries and segments within each watershed. This information will help place your stream in the context of a drainage basin as defined by the state, and familiarize you with the state system of categorizing and standardizing of water information.

The next level of detail for your pollution profile for your stream will come from the river basin plan for the watershed in which your adopted stream is located. The basin plans, prepared by DEQE's Division of Water Pollution Control (River Basin Planning Program), detail and explain what is summarized in the annual report "Summary of Water Quality", and is the best place to start for a list of the point source dischargers to your stream. The basin plan may also include description of non-point pollution if it is the source of degraded water quality, as well as information about the compliance of industrial and municipal dischargers with their National Pollutant Discharge Elimination System (NPDES) permit.

If your stream is small, or a discharger is small, they may not have been included in the sampling or review to be incorporated into the Summary of Water Quality or Basin Plan. All point dischargers to surface waters, however small, are required to have a permit, and DEQE regional offices (a list appears at the end of this section) will have a record of the small sanitary waste and groundwater dischargers which have permits under the Massachusetts Clean Water Act. This information is located in file folders, and is organized by town or city. These files are located in the Westborough and Boston Compliance/Enforcement Sections.

In some cases a phone call to the regional water engineer at DEQE will be all that is necessary to answer your questions. You should be prepared to write a letter requesting access to the files of dischargers to River A, for towns X,Y, & Z. Then you must arrange to visit the regional office and review the files during business hours. You should be prepared to take notes, because you will be charged for copies. Files for dischargers contain detailed technical and water quality information and correspondence that may seem imposing. As you become educated and active in issues of water quality and solving problems, the details of the information in the files will become more important and less mysterious.

For a complete summary of discharger compliance with permit limits over a period of time, EPA (located in Government Center in Boston) can provide a computer print out. This office currently writes the discharge permits and monitors compliance for all major industrial and sewage treatment plants in the Commonwealth. Their computers will sort and print out the records for a specific watershed over a specified period of time. The EPA office in Boston also has extensive files of background information, including permits, engineering and inspection reports as well as compliance records. Given a specific drainage basin, EPA can provide a computerized listing of the major and minor discharger at little or no cost. Again, some information may be obtained over the phone, but be prepared to write a formal request to review files and to visit the office for your review. To get this information, call:

E.P.A. Permits Processing Section
JFK Federal Building
Boston, MA 02205 (617) 565-3525
(617) 565-3525

When dealing with large federal and state agencies there are two traits to cultivate—politeness and persistence. Persistence is critical, given your need to obtain the information as a basis for your river protection efforts. You have a right to have access to the information and to speak with people who can answer your questions. You may be shuffled by phone by people who are new, or harried, or rude. Maintaining your composure and being polite as well as persistent will pay off when you get through to someone who can help you with your request for information.

The "Annual Water Quality Report Appendix III: Basin Segment Information" and River Basin Plans can best be obtained from:

DEQE Division of Water Pollution Control
Technical Services Branch
Westview Building
Lyman School
Westborough, MA 01581
(617) 727-6983

Individual discharger files can be found in DEQE Regional Offices, as well as in Boston and Westborough. In the regional offices, ask for the person in charge of water programs.

DEQE/Metro Boston/Northeast Regional Office
5 Commonwealth Avenue
Woburn, MA 01801 935-2168

DEQE/Southeast Office
Lakeville Hospital
Middleboro, MA 02346 947-1231

DEQE/Central Office
75 B Grove Street
Worcester, MA 01605 792-7650

DEQE/Western Office
State House West
436 Dwight Street
Springfield, MA 01103 (413) 785-5327

Devise a chart or table to organize the information you've collected. By recording the following key facts, you will have a good reference for locating further information to improve and protect water quality.

Watershed/Basin Name & Number:
Stream Name:
Location: *all towns/cities with frontage and/or in drainage basin*
Stream Classification: *describes use(s) and determines restriction of pollutant discharge*
General water quality problems and sources: *note sediment and non-point pollution problems*
Discharger profile: **Facility name and location:**
National Pollutant Discharge Elimination (NPDES #): **Type of Discharge:** *municipal sanitary wastes; municipal wastes with industrial waste contributions; non-toxic industrial wastes; toxic industrial wastes* **Design flow of treatment facilities:** *volume of water and waste plant can treat* **Actual flow of treatment facilities:** *measured whenever effluent is sampled* **Notes:** *on compliance, enforcement, expansion, etc.*

BIOLOGICAL STREAM SURVEY

How clean is the stream? This question is swiftly answered by examining the life that dwells within the flowing waters. Many stream creatures are quite sensitive to changes in water quality and therefore serve as indicators of environmental conditions.

Though most organisms dwelling in streams can be used to assess quality, the insects are best suited for this activity. This is because other creatures may be hard to collect or see with the unaided eye. For others, such as fish, a special collection permit may be required in some streams.

Most of the 220 different kinds (genera) of insects occurring in streams and rivers live in the riffles. The riffle is the faster flowing, shallower portion of the stream. It is also characterized by larger bed particles such as gravel, stones or even boulders.

Most stream insects are in the immature, larval stage, while the adults spend their lives on land. Some of these creatures may not be readily identifiable, since few resemble the adult insect while living in the stream.

Sampling Procedures

To assess stream quality by sampling the insect population, use a "Kick Seine" sampler or an old window screen (without any holes). To sample the insects, follow this procedure.:

1. Select a riffle which appears typical of the stream.

2. Place the "Kick Seine" at the downstream edge of the riffle.

Be sure that the bottom of the seine fits tightly against the stream bed so no insects can escape along this point. Also don't allow water to flow over the seine top. Otherwise insects will be carried out of the seine and lost.

3. Disturb the stream bed for a distance of three feet upstream of the seine. Brush your hands over all rock surfaces to dislodge any attached insects. Stir up the bed with hands and feet until the entire area three feet above the seine has been worked over. All detached insects will then be carried into the seine.

4. When step 3 is completed, carefully remove the seine with a forward scooping action. The idea is to remove the net without allowing any insects to be washed from its surface.

5. Place the net on a flat, light colored area. Using tweezers pick all the insects from the net and place them in a pan (preferably a white enamel pan 12" to 18" in diameter, but any will do). Any creature that moves, even if it looks like a worm, is part of the sample. Look closely since most insects are only a fraction of an inch long.

6. Once all insects have been removed from the seine, count the total number and divide this figure by the number of square feet sampled. If you collected less than 15-20 insects per foot the stream is either polluted or else you missed many individuals.

EXAMPLES: Seine width equals 3 feet
Distance upstream of net disturbed equals 3 feet
Square feet sampled equals 9
Number of insects collected from seine equals 500
500 divided by 9 equals 56 insects per square foot
Types of Insects

7. With step 6 completed, spread the insects evenly throughout the pan so that each individual can be clearly seen. Count the number of different kinds, but do not use size or color to differentiate kinds. General body shape, number of legs, tails, and so forth, are a far more reliable means. After several counts of different kinds, compute average. Stream quality can then be assessed by referring to the table below.

KIND	**STREAM QUALITY**
0-3	Poor
4-7	Fair
7-10	Good
10 or more	Excellent

This table usually gives lower quality assessments than more sophisticated techniques would, but it does provide a simple, quick means of determining general stream quality.

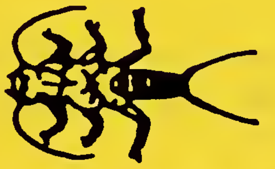
INSECT COUNT AND WATER QUALITY

In the case of	*Look for*
Great variety of insects, with few of each kind	Clean water
Less variety of insects, with great abundance of each kind	Overly enriched water with organic matter
No insects, but the stream appears clean	Toxic pollution

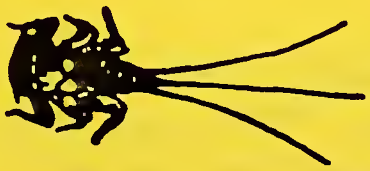
Types of Insects

You may further determine the water quality of the stream by identifying the numbers of different kinds of insects, mostly immatures, that live primarily in the shallow, gravelly, swiftly flowing "riffle" portions of the stream. We rely upon four types of insects to give a picture of water quality.

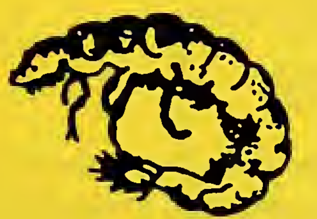
The four insect types, in order of their general tolerance of pollution (starting with the least tolerant) are: the stoneflies, mayflies, caddisflies, and true flies. All stoneflies have a roachlike body, two tails, and two hooks at the tip of each leg. The mayflies also have a roachlike body, two or three tails, but each leg simply ends in a fine point. The caddisflies possess a maggotlike body and have distinct legs. All true flies have a maggotlike body and lack legs and tails.



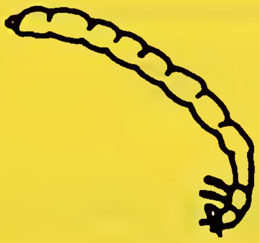
Stonefly



Mayfly



Caddisfly



Truefly

Using the identification tips given above, count the number of insects belonging to each of the four groups. Disregard any other insect types. Use the following guides to assess stream health.

Water Quality Rating Guidelines

Excellent:	Stoneflies, mayflies and caddisflies are present
Good:	Stoneflies are absent, but mayflies and caddisflies are present
Fair:	Only caddisflies and true flies are present
Poor:	Of the four groups, only true flies are present.

Stream Problems and Their Impact on Insect Life

a. Physical Problems may include excessive sediment from erosion or a pipe discharger. The sediment may create poor riffle characteristics, contribute to excessive flooding, reduce water in stream, change temperatures and smother insects. The results will usually be a reduction in the number of all animals in the study area.

b. Organic Pollution is from excessive human or livestock wastes or high algae populations. The result is usually a reduction in the number of kinds of insects and seems to favor collectors/scrapers (such as the caddisflies) with a large increase in the number of organisms per study area.

c. Toxicity—chemical pollutants such as chlorine, acids, metals, pesticides, oil. The result is usually a reduction in the number of insects. Usually a toxic problem is the only condition which will render a stream totally devoid of all insects.

Land Use

Most stream quality problems are a result of either land use or "point source" pollution discharges. If the land area draining to the stream is the problem, then your quality assessment will probably be as follows:

LAND USE	STREAM QUALITY
Forest	Excellent
Farmland	Good - Fair
Developed	Fair - Poor

When considering land use as the controlling factor in stream quality, look not just at the area visible from the stream, but at all the land draining to the stream—the watershed. If the stream drains an intensely developed area, do not be surprised if no insects are found at all. Should this be the case, consider using a forest or agricultural stream for a sampling comparison. You will probably find the difference quite startling.

Point source discharges accounting for poor or fair stream quality may be: sewage treatment plants, industries, construction sites, sewer overflows, landfills, mining operations, and a host of others. A point source discharge may be identified by sampling the stream at one mile intervals above the initial sampling point until quality improves. The pollution source should be located somewhere between the point of quality improvement and the last location where degraded conditions were found.

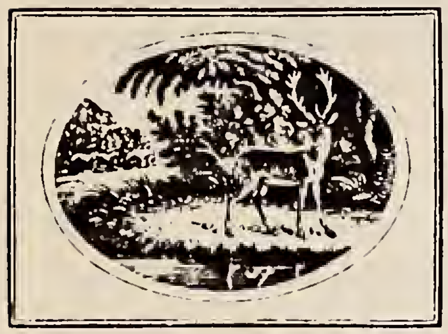
This form of quality assessment will normally work in streams three feet or wider. It can be an excellent means of demonstrating the ecological impacts of pollution.

NOTES:

- Since many streams in Massachusetts are bordered by private property which includes the river bottoms, permission from the landowner must be secured before a stream survey is conducted.
- During periods of cold or high water, participants should not attempt to take collections. Safety should be considered at all times. High water conditions create powerful currents that are dangerous and unpredictable. Such currents disrupt the macroinvertebrate populations; therefore, collecting during high water would not be of value. Cold surroundings can cause a condition called hypothermia which causes severe numbing of the limbs and the inability to move to an area of safety. *Do not enter the stream when the combined air and water temperature is less than 120°F.*

With thanks to The Izaak Walton League of America, 1701 North Fort Myer Drive, Suite 1100, Arlington, VA 22209 and **Save Our Streams**, Department of Natural Resources, Annapolis, Maryland 21401

Taking Action



STEP 6: ANALYZE YOUR DATA—BUILD ACTION PLANS. By now you will have formed a vision of the results of your **Adopt-a-Stream** project; taken inventories of the various resources you have to work with; begun to organize your group into an effective organization; and gathered various types of data and information which will help you determine the scope of problems and the best places to take action.

Now is the time to analyze the data you have, and see how this information indicates what actions your group should undertake to reach your goals.

Utilizing the information you have gathered to formulate an action plan requires not only analysis but also judgement about priorities, political realities, and the capacity of your group and its allies. It is unlikely that the process of analysis and developing an action plan can be done successfully with the whole group. One useful approach is to establish working committees, probably composed of the people who have been involved in gathering the information by topic, and ask each committee to develop a recommended action plan for a specified goal. Before your committees start work, it is useful to have a discussion with the full group to establish some general guidelines. How direct does your group want to be in its approach? Does the group want to focus on education for the public or contact with officials and others involved in specific issues? If you can arrive at a general agreement about your approach, your working committees will be more likely to come back with suggestions which the whole group will feel comfortable with and work on with enthusiasm.

Once committees have a set of recommendations, a presentation should be made to the whole group for discussion, amendment and eventual agreement. It often helps people reach agreement if they realize that whatever plan of action is chosen can be altered if the group finds that it is not achieving the desired results.

Before you begin an action plan you may also want to talk with kindred watershed or river groups, with supportive state agencies, and town officials to get feedback on your plans. But your plan should be your own, so that your group feels it fits your purpose, capabilities and goals for your river or stream.

Examples of how the data you've collected can help determine an action plan goal by goal follow.

Example #1 **GOAL: Water Quality**. Your group has successfully carried out its first "stream-walk" to assess general problems; and done a "stream survey" to observe the status of biological indicators of stream health.

In addition your group has obtained the applicable DEQE (Division of Water Pollution Control) publication for your river, stream or stretch of water. You have reviewed the information about the most dominant sources of pollution from DEQE's survey data.

From all this you have observed:

1. There is noticeable discoloration of the water at various locations which seems to be related to visible pipe outfalls. This corresponds with the biological survey done in these areas which shows that there are few varieties of insects and primarily those varieties which are tolerant of poor water quality. Farther downstream there appear to be conditions and species consistent with excess organics. There is no visible outfall, but there is a working farm nearby.
2. The DEQE data obtained from Water Pollution Control notes problems with industrial pollution in the first sections sampled and indicates agricultural run off in the second area section.
3. The land use information mapped shows that the farm is located in an area zoned for industrial development; and that several new housing units have been constructed nearby.

Your water quality committee assesses these data and makes the following recommendations for action to the whole group:

1. Further investigate the specific sources of outfalls (point sources) noted on the stream walk.

2. Check with DEQE (Division of Water Pollution Control) to find out if they have point sources on record or whether you must trace observed outfall pipes to their likely sources.

3. Upon verification of major pollution contributors, (via DEQE, field work, town or EPA records), begin systematic process of:

- contacting contributors and requesting compliance (specify what would constitute compliance);
- contacting all related public officials to call attention to the need for compliance (and lack thereof);
- monitoring sources with regular notification of their compliance: "congratulations" for improvement or achieving compliance; expression of regret and disappointment for continuing non-compliance; and
- informing the public of the lack of compliance, lack of enforcement, or progress being made using (a) press work dramatizing water quality problems; and (b) public meetings.

4. Assess the need for a physical clean-up and improvements along the river for stream bank protection to stop erosion, etc.; then (a) plan a clean up (see Worksheet #7), (b) organize constituencies and neighbors to participate;

5. Further investigate probable major sources of indirect or "non-point source" pollution (farm, road salt, golf club, etc.).

6. Begin systematic contacting of relevant parties, calling their attention to the problem and asking their voluntary cooperation. Try sending an introductory letter; requesting a meeting; meeting to suggest remedies; and periodic follow-up.

Examples: For a farm: Inform the farmer, encourage alternative methods of fertilizing, grading land to avoid drainage of pesticides, fertilizer of topsoil into the river. (A small buffer zone of plantings along the river could help—land could be donated or granted as an easement; reduction of application could help; integrated pest management could be considered; and careful timing of plowing and applications relevant to water levels and rain fall.)

For road salt: Work with the department of public works to reduce the amount of road salt used; change the sand/salt ratio; post the roads; and consider a river buffer zone by law (see land protection section).

For golf club: Point out problems with fertilizers and herbicides; request reductions in applications; planting of buffer zone; careful timing related to water flows and rainfall.

7. Develop and launch a public information program designed to encourage homeowners and small businesses to:

- reduce the use and disposal of hazardous materials in septic or sewage systems;
- take responsibility for reducing the quantity of water used;
- take responsibility for those habits which contribute most directly to pollution (see the excellent materials produced by the Virginia Chesapeake Bay Program, listed in Resource section of appendices and Information Sheet #8).

8. Request assistance from the Dept. of Fisheries, Wildlife and and Environmental Law Enforcement for advice on improving fish habitat along the river. Some debris, for example, may not interfere with canoeing or boating and will provide excellent gathering sites for fish. Factor this sort of information into the planning for river cleanups and get additional fishing enthusiasts involved. (See Worksheet #8 for information on stream bed erosion).

HOW TO ORGANIZE A RIVER CLEAN UP

A successful river clean up depends on good organization and enthusiastic participation by the public or members of your group. Good organization will assure that volunteers are used effectively and safely, that the details are attended to, and that the community and general public gains awareness of the river, its condition and potential. Enthusiastic participation will provide the energy required to do the physical work of cleaning the river, as well as serve an important public information role through the volunteers.

This checklist summarizes important tasks for organizing a clean up.

☐ Appoint a small working committee, with a strong chairperson or better yet, co-chairs, to coordinate the clean up day. This committee should organize details and find people to take responsibility for key components of the day.

☐ Determine the scope of the clean up. Will you focus on bank trash, water debris, heavy debris or obstruction? How much of the river will you cover? The entire length or just selected portions? How much of adjacent lands will you work on?

☐ Inventory the river area to be cleaned. Take note of the conditions, key sites and other factors which will affect how the cleanup is organized. Keep these points in mind:

- Note the worst and most visible sites. It is useful for community residents to be able to see the activity happening at sites they have probably noted themselves to be bad.

- Utilize input gathered ahead of time from groups (such as sports clubs, garden clubs, conservation commissions) who have an interest in the river. Using this input, prioritize the segments for action. You can assign volunteers to sections as they arrive, saving the least important sections to the end.

- Estimate the time and equipment needed to clean each segment. Small brooks can be cleaned by younger kids (supervised); while sections with higher flows and heavy trash or debris can be worked on by the adult volunteers with large equipment.

- Determine access points for safe use of large equipment if machinery is going to be used.

- Obtain commitments for supplies, materials and equipment needed. Items you may need include:

  - food for refreshments, picnic at the end of the clean up

  - garbage bags

  - gloves

  - trucks, tractors with backhoes, dumptrucks, come-alongs

  - balloons or other eye-catching decorations along the clean up path

  - rakes, hoes, ropes

- garbage cans or other collectors

  Many of these items may be donated or loaned from local businesses, town departments or townspeople.

☐ Heavy equipment is particularly important item to secure for the day. For water-soaked logs, parts of cars, refrigerators or similar large and unwieldy items, such equipment will be safer and quicker than any other methods. It is crucial to specify the times you want the equipment; the locations and safe access points; the availability of skilled operators; and supervisors from the clean up committee who can monitor progress and answer questions site by site.

If the site is on private property, you must also have permission to get access to the premises.

☐ Recruit people to help. Invite all sorts of people. Youth groups can be particularly energetic and helpful (try the Boy and Girl Scouts; 4-H Clubs, Future Farmers of America Clubs); also sports clubs, civic clubs or lodges environmental groups; canoeists; church groups and so forth.

☐ Publicize the event through the town Board of Selectmen; local newspapers; flyers or posters; local radio stations; etc.

☐ Alert the town dump or recycling center—be sure you have complied with necessary permits or other arrangements for dumping the refuse you collect.

☐ Make sure there is clear information about where people should meet in the morning; where assignments will be made; where to pick up materials and equipment; when and where refreshments and meals will be served; where to report problems; where to report completion of a section; where to turn in equipment or materials and so forth. Be sure that your coordinating team is clear on its assignments for the day.

☐ Record the names of volunteers so that each person can be thanked. Also all donors should be recorded so that their contributions can be publicized and they can be thanked.

☐ Consider the issue of insurance for accidents; if insurance is not to be provided, public disclaimers should be made through the media and posted on sites.

☐ Be sure you have a complete safety plan including first-aid readily available and well publicized. Safety rules should be publicized and posted. Remember that water can be very cold even in late May and early June. A half day event is often as much as people can handle safely without becoming over tired.

☐ Publicize your event after it is completed—let the community know how successful you were and be sure that all participants are publicly thanked for their contribution.

POTENTIALLY POLLUTING PRACTICES
How You Can Reduce Non-Point Sources of Pollution

Practice	Environmental Effect	Alternative
Pouring oil drained from cars into street or gutter.	When oil enters stream it can kill aquatic life.	Take the oil to a service station. Most station managers will allow customers to pour their used oil into the station's storage tank. (Mass. Law requires any place that sells oil to take used oil back.)
Dumping grass clippings material or leaves into a stream or gutter.	When the leaves or grass enter water they will decay and use up oxygen.	Either be composted or bagged and put out with trash. Leaves could be mulched running a mower over the lawn with the vent closed. Grass may be left on the lawn, or raked up after every third cutting.
Fertilizing the lawn.	Fertilizers, when washed into a body of water, can cause algae to grow too much.	Most lawns need only nitrogen. This gets rid of the need for the stronger phosphorus fertilizers that encourage algae. Directions on the fertilizer bags should always be followed.
Spraying pesticides about the home and garden.	Pesticides can kill fish and other life when washed into our waters.	Maintaining a healthy lawn with proper cutting and careful fertilizing is the best way to keep out weeds. Bugs that attack garden plants can usually be washed off with a hose or picked off by hand.
Allowing pet to run free.	The manure pets leave behind on the ground can spread disease or use up oxygen when washed into our waters.	Pets should be kept within a fence or on a leash.

RECOGNIZING AND CONTROLLING EROSION

Erosion of soil from stream banks or other sources can cause serious problems for a stream or waterway. Erosion of sediment into a stream can smother aquatic life and clog the gills of fish as well as cutting off needed light to underwater plants.

Erosion is the process by which beating rain and moving surface water or run off dislodge and carry soil particles, organic matter and plant nutrients as they flow. The texture of the soil and its potential for absorbing water, the steepness of the slope and the adequacy of protective cover on the soil are all factors which influence the extent of erosion. Although erosion is a natural process, an unnatural acceleration of this process may be caused by land—disturbing activities of people.

A gully is easily recognized as evidence of an erosion problem. Unfortunately, not all erosion is as easy to pinpoint. Muddy water is a clear indication that erosion is occurring but it may only be visible for a short time following a rain. However, the damage will continue unless something is done to prevent or reduce it. When erosion is not abated at its source, three to five miles of stream can be seriously degraded with recovery taking 50 years or more.

Oftentimes, in urban, suburban and rural areas, impenetrable surfaces such as pavement, rooftops and compacted soil prevent rain from filtering down into the soil and excess runoff is created. Ask yourself the following questions to determine if erosion is a problem in your stream:

- Is there a buildup of silt in the stream?
- Are the channels of the stream becoming wider and deeper?
- Are there fallen trees in the stream?

Fortunately there are many things you can do to prevent and minimize the damage caused by erosion. Try some of the following:

- Remove obstructions from your stream.
- Keep people, cars and grazing animals away from the edge of the water.
- Build steps or a ramp between the top and bottom of a bank if you need access to the water.
- Plant protective vegetation on the slopes of the stream banks and on the areas adjacent to the bank.
- Consult a trained engineer about structural sources for controlling erosion.
- Seek advice from local agencies on available resources.
- Investigate possible sources such as construction sites to see if a lot of sediment is escaping due to inadequate barriers.

Planting trees along streambanks is one of the most effective ways to slow down the process of erosion. Tree roots remove nutrients and sediments harmful to the stream as well as breaking the fall of rain which allows the rain droplets to be absorbed into the soil. The Department of Fisheries, Wildlife and Environmental Law Enforcement, Westborough Office, Fisheries Staff, (617) 727-2864, can tell you which trees are most suitable for your stream bank.

With thanks to The Izaak Walton League of America, 1701 North Fort Meyer Drive, Suite 1100, Arlington, Virginia 22209.

Example #2 **GOAL: Land Protection.** The members of your group especially interested in land protection have participated in the stream walk and observed the lands bordering the river. Mapping has provided detailed information on the location of wetlands and other vulnerable sites (such as steep slopes, etc.); the current land uses; the allowable (zoned) uses even if not yet so developed; and the town's conservation lands, none of which are along the river.

You have also filled out the checklist of local river resource protections in your town's bylaws.

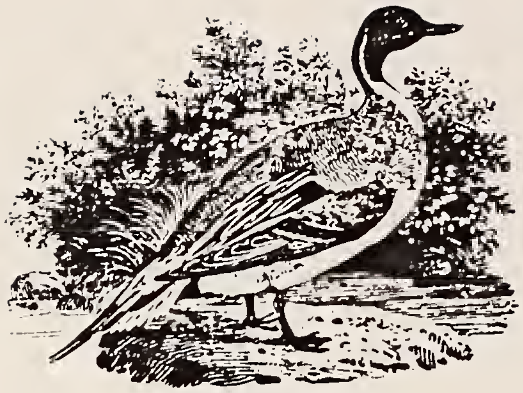
This information tells you:

1. A high percentage of vulnerable and biologically valuable wetlands are still zoned industrial, commercial or residential.
2. The major working farm along the river is in an area zoned for industrial development.
3. The current town's planning map shows increased residential construction activity in two areas adjacent to the river where roads providing deeper access to the river already exist.
4. Your town has scored only "Fair" on the check list of bylaw or administrative protections for river resources. Seven years ago, you found out, before land pressure was so strong, a wetlands protection zone was voted "not necessary" in town meeting.

Your land protection committee recommends to the entire group the following actions:

1. Complete an inventory of ownership so that you know who owns property along the river.
2. Meet with the local Conservation Commission, as well as contacting various state and private organizations (land trusts, Fisheries, Wildlife and Environmental Law Enforcement, Conservation Services, etc.) to find out what local actions can be taken to protect parcels.
3. Identify most vulnerable parcels by using criteria such as: age of owner; zoning of property for high-pressure uses (such as residential, industrial); near sites with recent

construction; whether owner is absentee and perhaps less aware of town concerns; near roads that encourage construction; rare or endangered species habitat; etc.



4. Contact land owners to explain options for protection including:

   - Conservation easements
   - Donations
   - Purchase (fee simple)
   - Agricultural protection restriction

   (See Information Sheet #9 for definitions and explanation of types of protections).

5. Contact Department of Fisheries, Wildlife and Environmental Law Enforcement with information about interested sellers, local tax title land, or parcels owned by other agencies who might consider transfer to DFWELE, Department of Environmental Management or similar conservator.

6. Review model bylaws that could be brought to town meeting to strengthen river-front protections. Develop appropriate bylaws for presentation to town meeting.

7. Identify administrative changes which could be made; for example, reducing road salt; enforcing wetlands protection act; exercising health board powers more consistently or fully.

8. Provide public information and education on the importance of protections to your entire community. Be prepared for some lively debates on property values and owner's rights. Build public support for protection. Offer to send speakers to other towns along the river in order to spread the awareness of the need for action at the local level.

TYPES OF LAND PROTECTION TECHNIQUES

TECHNIQUE	EFFECT ON LANDOWNER	EFFECT ON PROTECTION GROUP	EFFECT ON COMMUNITY
Fee-Simple: *Outright Purchase*	• Negotiates sale price with buyer. • Pays capital gains tax. • Forfeits control of land.	• Funds depleted by purchase price. • Obtains full ownership and control of property. • Responsible for operations & maintenance (O+M) costs. • Option to provide public access.	• Land removed from tax rolls. • Adjacent land values may increase. • Potential for public access. • Town is reimbursed through services rendered by the state for Commonwealth-owned lands.
Gifts or Donations	• Receives no income for land transaction. • May have survey, legal, and deed preparation costs. • Eligible for reduced income, property and estate taxes, except Massachusetts income tax. • Pays no capital gains tax. • Forfeits control of land.	• Obtains full ownership and control of land at minimal or no cost. • Option to provide public access. • Responsible for O+M costs. • May share or cover survey and deed preparation costs.	• Same as above.

Bargain Sale	• Receives income, below Fair Market Value (FMV). • Pays reduced capital gains tax. • Eligible for reduced income, property and estate taxes on donated portion of transaction. • Forfeits control of land.	• Obtains full ownership and control of land at reduced cost. • Responsible for O+M costs. • Option to provide public access.	• Same as above.
Less-than-Fee Simple: *Purchase & Resale* *or* *Land Banking*	• Original landowner receives FMV of property, pays capital gains tax and forfeits control of land. • New landowner purchases land encumbered with restrictions and has potential to generate income within limits of allowed uses.	• Overall protection cost is low; however, need initial capital to purchase land. • Forfeit O+M responsibilities once land is resold. • Desired level of protection can be obtained through placement of restrictions prior to resale.	• Land reverts back to private market, therefore remains productive and on tax rolls. • Restrictions result in lower assessment value. • Potential for public access, depending upon restrictions. • Towns may acquire and hold land and resell depending on conditions of purchase.
Purchase & Leaseback	• Original landowner receives FMV of property, pays capital gains tax and forfeits control of land. • Leasee can generate income from land within limits of allowed uses.	• Same as above except potential exists for profits from leasing of land. • Non-profit protection groups may be required to pay property taxes if land is leased	• Local communities may generate enough lease revenues to offset loss of property tax revenues. • Potential for public access, depending upon restrictions.

Long-Term Lease	• Retains control and ownership of land. • Responsible for O+M costs. • Any economic gain is taxable.	• Inexpensive means of obtaining protection and/or public access. • No control over use of land.	• Land remains on tax rolls. • Potential for public access.
Land Restrictions:			
Easements & Conservation Restrictions	• Receives income for FMV of easements, if sold, and assessed capital gains tax. • Receives tax benefits, if donated. • May have land survey, legal and deed preparation costs. • Experiences reduced property and estate taxes. • Maintains ownership and control of land.	• Obtains protection and/or public access at reduced cost. • Difficulty in determining value of easement. • O+M responsibilities depend upon negotiated agreement. • May share survey, legal, and deed preparation costs.	• Land remains on tax roll but at reduced assessment value. • Potential for public access. • Town Conservation Commission may hold CR's and be responsible for monitorings.
Agricultural Preservation Restriction Program	• Receives income from State for forfeit of development rights and assessed capital gains tax. • Pays lower property tax. • Maintains ownership, control and current agricultural use of land. • Restriction recorded in perpetuity.	• Protection obtained at no direct cost. • No control over use of land. • Not responsible for O+M costs.	• Land remains on tax roll but at reduced assessment value; no requirement for public access.

Transfer of Development Rights	• Receives income for loss of development in protected area.	• No cost; protection cost is borne by private developers.	• No expense to town for land acquisition. • Allows economic benefits for one development while protecting natural resources. • May permit intensive development in specified areas. • May specify use of tax revenue from such new development.
Subdivision Regulations	• Retains ownership, control and ability to develop land. • Development subject to regulation process.	• River corridor protection not guaranteed.	• Land assessed at higher value due to improvements. • No requirement for public access.
Wetland Protection Programs	• Retains ownership of land; however, use restrictions exist. • Pays reduced property taxes.	• Protection obtained at no direct cost. • No control over land.	• Land remains on tax rolls, but at reduced assessment value. • No public access.
Tax Incentive Programs: *Chapter 61 Forestry* *61A Agriculture* *61B Recreation*	• Pays lower property taxes. • Management Plan required by 61 & 61A. • Maintains ownership, control and current use of land. • Pays penalty taxes if withdrawing or fails to comply with management plan.	• Limited and potentially short-term protection achieved at no direct cost. • No control over use of land.	• Land remains on tax rolls but at reduced assessment value. • No requirement for public access.

Government Regulatory Programs: *Floodplain Cluster Zoning*	• Floodplain zoning places restrictions on land or prohibits development. • Cluster zoning allows landowner to develop land at traditional density while leaving river corridor undeveloped. • Pays reduced property taxes, if land is restricted.	• Protection obtained at no direct cost. • No control over use of land associated with cluster zoning is deeded to local community protection group.	• Restricted land assessed at lower value. • No publics access, unless land deeded to local community or protection group under cluster concept.

STEP 7: KEEPING YOUR ORGANIZATION STRONG. These model action plans are ambitious. The work described could take the average group not one year, but several years.

To carry out the Action Plan your group actually develops, you will need a strong, resilient group which is large enough to carry out the tasks connected to a comprehensive plan.

Building a strong group is not accidental, or even necessarily natural. It takes awareness, thought and work. But investment in your group's strength and growth will pay off handsomely over the years.

Remember that every group goes through stages: early struggles; success and growth; maturity and maintenance; and, sometimes, demise. You may not realize when your group is moving from one stage to another, but you will feel the pressure. It is often surprisingly helpful simply to recognize you are in a transition—sometimes ideas for improvements and changes will occur at that point. It is also important to realize that people have different skills and strengths. The person who was super as an organizer and "do-it-all" type in the early stages, may not be an effective administrator in later stages. The Board which launched the group may not have all the skills to carry it into a more mature and sophisticated stage. These changes are NATURAL and need to be prepared for and taken in stride, not viewed as trauma. A strong group needs all its members; a wise group will assess roles periodically to test the best fit of skills to needs.

Here are some pointers for keeping your group alive and strong and effective.

Outreach and diversity: To be effective a group needs to keep growing. A good way to build a strong base is to reach out to groups who have a natural common interest in the river, even if river preservation is not the first priority. This means fishing and hunting clubs, canoe groups, conservation and outdoors groups, youth and civic groups, science teachers and students, environmentalists, etc. Invite them to be organizational members, to lend their memberships for major activities, to co-sponsor events.

Remember: the greater the diversity of your group, the greater skill at keeping the group focused on its common agenda will be needed. The payoff can be greater strength, numbers and perspective on issues.

Good leadership: Good leaders are developed, not born. A dominant or vocal or sprightly personality may not be the best leader. Leadership requires a strong sense of self (but not a self-centered character); the ability to articulate the group's goals and the related tasks without personal bias; the ability to organize people into effective work groups; the ability to track assignments, inspire participation and encourage long-term commitment. A leader first of all understands other people and knows how to keep them involved and moving.

Leaders or potential leaders are in every group. They may not always be the people you notice at first glance. Pay attention to who helps clarify, facilitate, assign, review, sort and articulate. Who seems to help other people get their points across clearly? Encourage these people to try "leadership" roles in a small way. As confidence and comfort grow, so, usually, does willingness to take on more work. Try rotating some leadership responsibilities or sharing through "Co-chairing" or other partnerships. It is tremendously helpful for a group to have a number of people able to provide leadership in a variety of ways, not just one leader for all purposes.

Run good meetings: There are some very specific tips which will help your group run good meetings that get things done, provide satisfaction and keep people involved. Try these methods:

- Make sure there is a clear agenda, with specific time allotments for each item, and a clear idea of the outcome you are seeking for each item—decision, information sharing, discussion only, or referral to committee or working group.
- Have participants sit in a circle or semi-circle so that each person can see all the others. The Chair will have an easier time, everyone will feel more of a participant, and you will generally have a greater sense of cohesion.
- Review the agenda at the beginning of the meeting to clarify expectations; set aside a small amount of time for addition of forgotten items, suggestions for changes, etc.
- Have a timekeeper for the meeting (often it is useful to have this be someone other than the Chair so that the Chair can concentrate fully on the discussion). Stick to the agenda and times set. If it appears that you need more time for an item, call a time check and ask the group for agreement about

whether to extend the time, table discussion or make a decision. If at all possible, the Chair should remind the group of its time limits a few minutes before actual time is up to minimize pressure on decisions and discussion.

- Encourage everyone to speak. In the case of committee reports, the spokesperson chosen by the committee should present information. When there is a need for clarification or discussion, the Chair should encourage people to speak up. However, the Chair needs to be prepared to point out when one person has taken more than a fair allotment of time. Setting a time limit on discussion at the outset encourages people to make their points; a good Chair can help people be succinct.

- The Chair should review points that have been made. By summing up the Chair can facilitate understanding and speed up the overall process.
- The Chair should help discussion achieve resolution if that is the desired outcome. This can be done by formulating points for decisions, helping the group to see the alternatives which have been put forward during discussion, and clarifying just what decision is being made at any given point. Often resolution can be accomplished through a "sense of the group." If there is significant disagreement or confusion, it may be wise to call a vote.
- Notes should be taken at all meetings and clarification should be made at the moment as necessary to avoid confusion after the fact. If a task is assigned and given a timeframe, this should be noted.
- Tasks should be made in the most specific way possible; a person should be assigned to a task; a time-frame should be given.
- Set your next meeting at the end of each meeting session. Thank people for attending, express appreciation for their work. Agree on a process for notifying everyone, particularly people who could not attend this meeting.

Keeping volunteers involved and coming back:

Volunteers are the backbone of most non-profit activist groups. You need to treat them carefully. Volunteers can take a lot of supervision since their time is intermittent and their work must be "patch-worked" together into the whole quilt of your action plan. Here are some suggestions for making the most effective use of your volunteers:

- Know their skills (use Worksheet # 2).
- Fit tasks to skills if possible.
- Provide clear instructions and supervision if needed to avoid confusion or having to redo tasks
- Make tasks self-contained, if possible, so that supervisors do not have to try to figure out where the last volunteer left off and the new person is to begin.
- Help volunteers understand how their tasks, however small, fit into the whole picture of your action plan; even drudgery tasks can take on importance if placed in context.

- Thank volunteers, invite them back, provide public recognition whenever possible.
- Put people to work in teams whenever possible to add a social dimension to work—some great friends can be made through this sort of community work.

Public involvement: Ultimately the protection of a river or stream will depend on the public support for the goal of protection. The best way to generate public support is to get the public involved. Here are some ways to increase public involvement and support for your work:

- Ask for support from a broad sector of your community; ask businesses to donate garbage bags for clean ups, computer time, hot dogs and soda for a festival, printing or photocopying, etc. Fit the request to the business's own products: if appropriate you might encourage donors to put their logo on donated products to give them public recognition and to demonstrate wide-spread support for your work.
- Provide public information via public meetings, regular letters to the editor of your local paper, a column in the local paper, Public Service Announcements (PSA's) or editorials on cable or local TV stations.
- Schedule regular visits to public officials such as planning board, conservation commission or health board, business leaders, and even the Chief Executive Officers of companies headquartered outside your region (by mail if more practical). At a minimum send these contacts a letter introducing your organization and a regular copy of your newsletter.
- Invite the public periodically to enjoy the river and participate directly in its protection and improvement

through clean-up days, festivals, canoe races, fishing contests, and any other means you can devise. The more people use their river the more likely they are to support efforts to protect it.

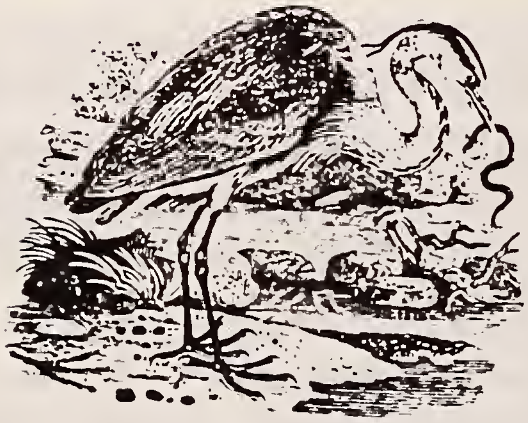
Sound finances: There are two crucial dimensions of sound finances: (1) fundraising, and (2) financial management. Often they are handled separately by a fundraising committee and treasurer, respectively. But they must be viewed together for sound overall financial planning. You must have an idea of what you need to finance in order to plan how (and how much) to fundraise. You must have a good guess about how much you can raise before you commit yourself to costly plans. Be sure your key financial people or committees meet together periodically and get the input of the full board often enough to avoid financial confusion.

Some suggestions:

- Make your fundraising plans modest to begin with.
- Look for "in-kind" donations, that is, materials or services provided directly by the donor rather than cash.
- Don't feel uneasy about asking people for funds—remember that you are offering them a chance to participate in important work; some people have time to contribute, some have money. It's a fair trade.

- Be specific about how much you need and why. People are sometimes more likely to donate money if they know what it will be used for; but remember that you must use the money the way you say you will!
- A "no" from a potential donor does not mean that they dislike you, dislike the project, or will never give again. Be sure that you have answered all the questions a donor may have, and if appropriate, indicate that you will ask again when another need arises.
- Be sure that financial supporters receive recognition in the community. Some donors, however, may wish to be less visible; be sure you check before you publicize someone's gift. In the cases where public recognition is not desired, be sure that your organization provides private thanks.
- Try to keep donors apprised of the outcome of their support—provide periodic information about how their donation has been used. This may increase the chance that they will give again.

- Look for ways to build in steady, low-level support from many sources—a pledge system may work, charter members, annual gifts, etc. Be sure that you do not rely too much on any one source of funds such as grants or private donors. A broader financial base is stronger.
- Research sources of federal, state and local funds, including grant programs, foundations, contracts, etc. Be sure you fully understand the terms and conditions of each source. Special demands or restrictions on some sources of funds may make them more trouble than they are worth.
- There are some excellent sources of information about fund-raising for non profit groups. See Resources List in appendices for suggestions.



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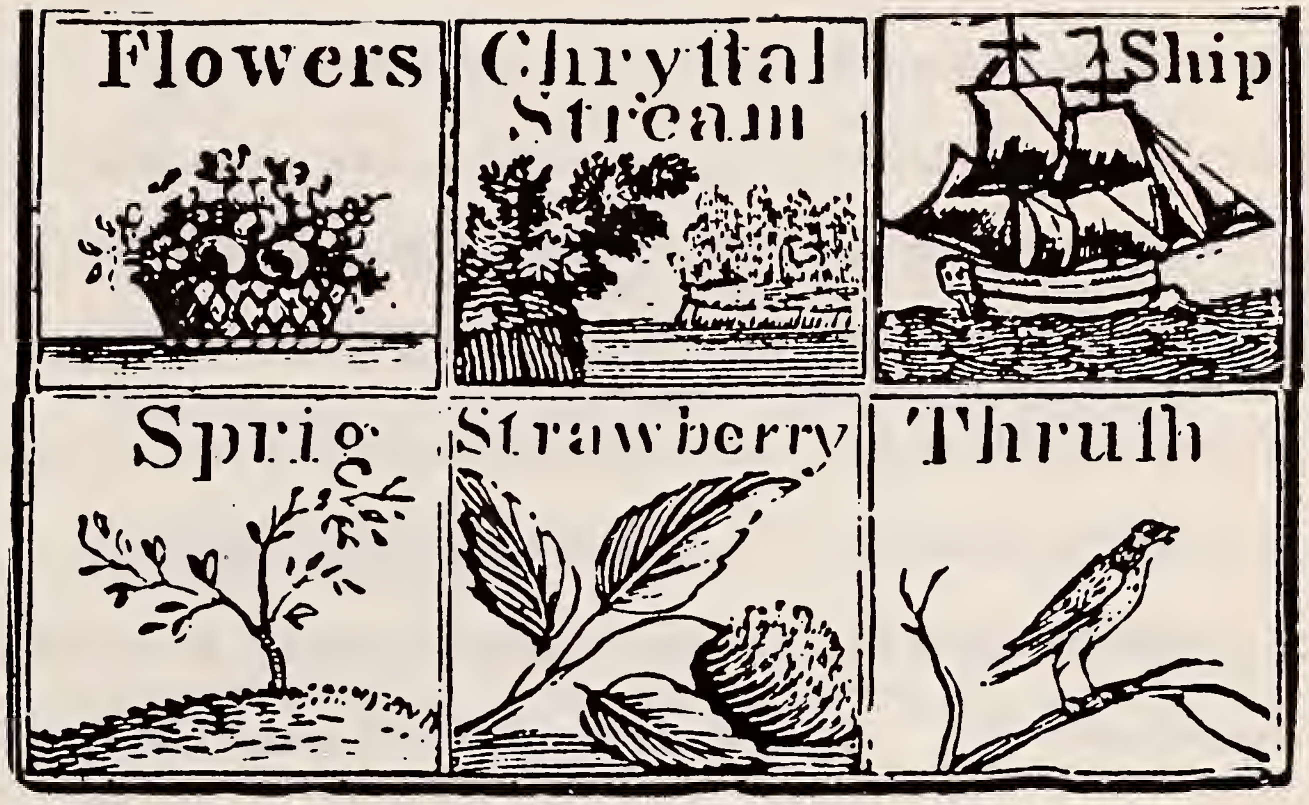

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Resources

Audio Visual Presentations

"One County's Water" Slide /Video Presentation, Massachusetts Audubon Society.

"For the Common Good: Preserving Private Lands with Conservation Easements." A 16-minute film or video documenting the public benefits of conservation easements. Land Trust Exchange, Box 364, 13 Albert Meadow, Bar Harbor, Maine, 04609.

Canoe Guides and Public Access

"AMC River Guide," Massachusetts, Connecticut, Rhode Island, Appalachian Mountain Club, Boston, MA, 1985.

"A Canoe Guide to the Housatonic River, Berkshire County," Housatonic River Watershed Association & Berkshire County Regional Planning Commission, 5 Westminster Road, Lenox, MA 01240.

"Canoeing Map of the Ipswich River," Ipswich River Watershed Association, Inc., 562 Maple Street, Hawthorne, MA 01937.

"Charles River Canoe Guide," Charles River Watershed Association, Auburndale, MA 02166.

"The Complete Boating Guide to the Connecticut River," Connecticut River Watershed Council, Inc., 125 Combs Road., Easthampton, MA 01027.

"The Nashua River Canoe Guide," Nashua River Watershed Association, 484 Main Street, Fitchburg, MA 01420.

"Public Access to the Waters of Massachusetts," Public Access Board, 100 Nashua Street, Boston, MA 02114.

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Guide to Application of the Interbasin Transfer Act & Regulations, Massachusetts Department of Environmental Management, Division of Water Resources, December, 1985.

Environmental Resource Protection Tools in Massachusetts, 1987, Division of Planning & Development, Department of Environmental Management.

"Executive Office of Environmental Affairs: An Introduction to the Policies and Activities of EOEA Agencies." Coastal Brief, Massachusetts Office of Coastal Zone Management, March, 1987.

"Directory of State, Federal & Regional Water Planning & Management Agencies," Massachusetts Department of Environmental Management, Division of Water Resources, August, 1986.

"Massachusetts Natural Resource Agency Directory," 1987, University of Massachusetts Cooperative Extension.

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"Forest Land Taxation in Massachusetts, Chapter 61, 61A, 61B." Cooperative Extension, Massachusetts Forest Resource Notes, Department of Forestry and Wildlife Management.

"Questions & Answers about Massachusetts Forest Law," Division of Forests & Parks, Department of Environmental Management, May, 1987.

"Report of the State Forestry Committee on Minimum Forest Cutting Practices Regulations," Division of Forests and Parks, Massachusetts Department of Environmental Management.

Groundwater

Groundwater Information Series, Community Groundwater Protection Project, Massachusetts Audubon Society:

1. "An Introduction to Groundwater & Aquifers," May, 1985.
2. "Groundwater & Contamination: From the Watershed into the Well," May, 1985.
3. "Mapping Aquifers & Recharge Areas," November, 1985.
4. "Local Authority for Groundwater Protection," November, 1985.
5. "Landfills & Groundwater Protection," July, 1986.

Groundwater Protection: A Guide for Communities, Metropolitan Area Planning Council, April, 1982.

Underground Petroleum Storage Tanks: Local Regulation of a Groundwater Hazard, Conservation Law Foundation of New England, Inc., 3 Joy Street, Boston, MA 02108.

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"APR: Saving Farmland in Massachusetts," Massachusetts Department of Agriculture.

"A Profile of Local & Regional Land Conservation Community, Massachusetts," 1985-86 National Directory of Local & Regional Land Conservation Organization, Land Trust Exchange, 14 Albert Meadow, P.O. Box 364, Bar Harbor, Maine 04609.

Community Guide to Open Space & Recreation Planning, Massachusetts Department of Environmental Management & Division of Conservation Services, May, 1985.

Developing a Land Conservation Strategy: A Handbook for Land Trusts, Adirondack Land Trust, May, 1987.

"For the Common Good: Preserving Private Land with Conservation Easements," a 16-minute film or video documenting the public benefits of conservation easements. Land Trust Exchange, Box 364, 13 Albert Meadow, Bar Harbor, Maine, 04609.

Non-Zoning Land-Use Protection Technique, Metropolitan Area Planning Council, December, 1978.

"Open Space Programs," Massachusetts Executive Office of Environmental Affairs, 1987.

"Report on 1985 National Survey of Government & Non-Profit Easement Programs," Land Trusts Exchange. Vol. 4, No. 3, December, 1985.

Organizing

"Bay Watchers Volunteer Survey," Chesapeake Bay Foundation, 162 Prince George Street, Annapolis, Maryland, 21401.

"How to Use the Media," Grassroots Fundraising Journal, December, 1985.

"One County's Water" Slide/Video Presentation, Massachusetts Audubon Society.

Winning Local & State Elections: The Guide to Organizing Your Campaign. Ann Beaudry & Bob Schaeffer, Free Press, Macmillan, Inc. N.Y. , 1986.

River Classification & Inventories

"Scenic & Recreational Rivers," Massachusetts Department of Environmental Management, Scenic Rivers Program, June, 1982.

"Stream Classification Program, Massachusetts, Part 1: Inventory of Rivers & Streams," Massachusetts Department of Environmental Quality Engineering, Division of Water Pollution Control & Department of Fisheries, Wildlife & Environmental Law Enforcement, July, 1982.

Vermont Rivers Studies: River Conservation Assistance Program of the National Park Service & Agency of Environmental Conservation, Montpelier, VT 05602.

River Protection Guides

Baybook: A Guide to Reducing Water Pollution at Home, Virginia Chesapeake Bay Program, August, 1986.

Guide to River Protection in Massachusetts, Massachusetts Department of Environmental Management, July, 1981.

Riverwork Book, U.S. Department of the Interior, National Park Service, Mid-Atlantic Regional Office, Division of Park & Resource Planning.

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Stream Corridor Management: A Basic Reference Manual, New York State Department of Environmental Conservation, January, 1986.

"Citizen's Guide to River Conservation," The Conservation Foundation, Washington, D.C., 1984.

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We All Live Downstream: A Guide to Waste Treatment That Stops Water Pollution, Pat Costney, H. Gettings, G. Booth, Waterworks Publishing Company, Eureka Spring, Arkansas, 1986.

Water Quality & Supply

"Acid Rain Monitoring Project," Water Resources Research Center, University of Massachusetts, Amherst, 1985.

The Case for Conservation: Meeting the Future Water Needs of Massachusetts Water Resources Authority through Conservation, Leak Repair and Water Supply Protection, 1986, Massachusetts Audubon Society.

Clean Water: Citizen's Handbook on Water Quality Standards, Natural Resources Defense Council, May, 1987.

"Contamination in Municipal Water Supplies," Massachusetts Special Legislative Commission on Water Supply, December, 1986.

"Goal of Clean Rivers: Do We Quit Now?" Connecticut River Watershed Council, Special Report. Winter, 1987.

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"Summary of Water Quality, Commonwealth of Massachusetts 1986," Massachusetts Department of Environmental Quality Engineering, Division of Water Pollution Control, March, 1986.

Appendix I	1985 Surface Water Quality Standards
Appendix II	Massachusetts Lake Classification Program
Appendix III	River/Harbor Segment Water Quality Information

Water Resources Protection Techniques, Metropolitan Area Planning Council, October, 1978.

"Water Supply Protection Atlas Handbook," Massachusetts Department of Environmental Quality Engineering, Division of Water Supply, 1982.

"You and Your Drinking Water," U.S. Environmental Protection Agency, Office of Public Affairs, December, 1986.

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"Planning Work in a Waterway or Wetland? U.S. Army Corps of Engineers, New England Division.

"Wetlands & Floodplains on Paper," The Wetlands Project, Massachusetts Audubon Society.

"Wetlands & Waterways: A General Guide to the Massachusetts Regulatory Programs," Massachusetts Department of Environmental Quality Engineering, Division of Wetlands & Waterways Engineering, November, 1984.

"Wetlands of the United States: Current Status & Recent Trends," U.S. Department of the Interior, Fish & Wildlife Service, March, 1984.

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"The Best Trout Streams in Massachusetts: Where to Find Them; How to Fish Them." Joe Michniewiez, Worcester Telegram & Gazette, 1982.

Field Book of Freshwater Life, Elsie B. Klots, G.P. Putnam's Sons, N.Y. , 1966.

"Habitat Highlights," a newsletter, Agency of Environmental Conservation, Vermont Fish & Wildlife Department, 10 South 2nd Floor, 103 South Main Street, Waterbury, VT 05676.

Massachusetts Wildlife, a quarterly publication of Massachusetts Division of Fisheries and Wildlife, Information and Education Section, Field Headquarters, Westboro, MA 01581.

"Placing Wildlife Management in Perspective," Wildlife Management Institute, 1984.

"A Policy for the Conservation of Inland Fish & Wildlife Resources of Massachusetts," Massachusetts Department of Fisheries, Wildlife & Environmental Law Enforcement, 1984.